10th NCERT Solutions

Chapter - 02

BIOLOGY

Control and Coordination

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TOPICS to be covered

1. Control and Coordination
2. NCERT Questions Discussion

INTEXT QUESTIONS

QUESTION-

What is the difference between a reflex action and walking?

[CBSE 2019(31/3/3)]

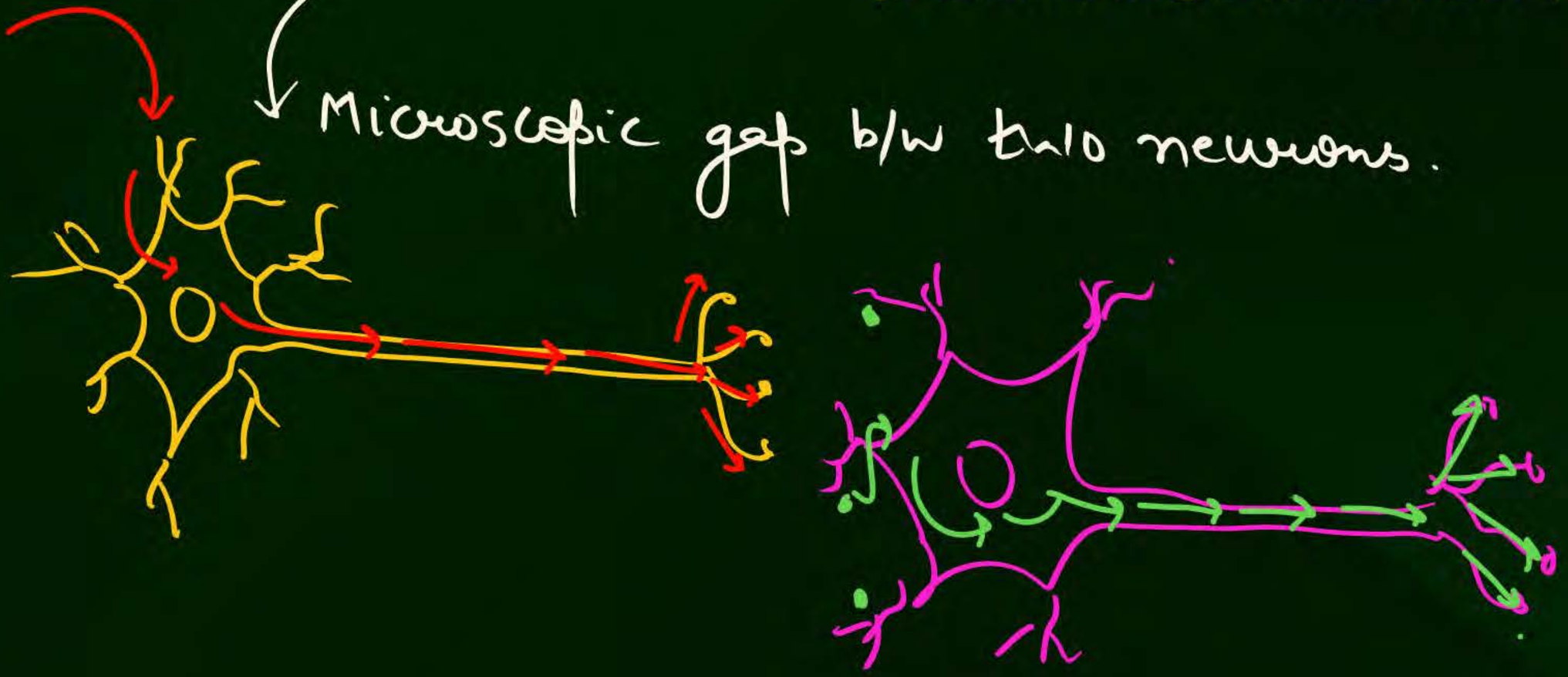
Answer

Reflex action	Walking
- Reflex action is involuntary action	- Walking is voluntary action
- It is controlled by spinal cord	- It is controlled by brain

QUESTION-

What happens at the synapse between two neurons?

[CBSE Marking Scheme 2019 (31/3/3)]



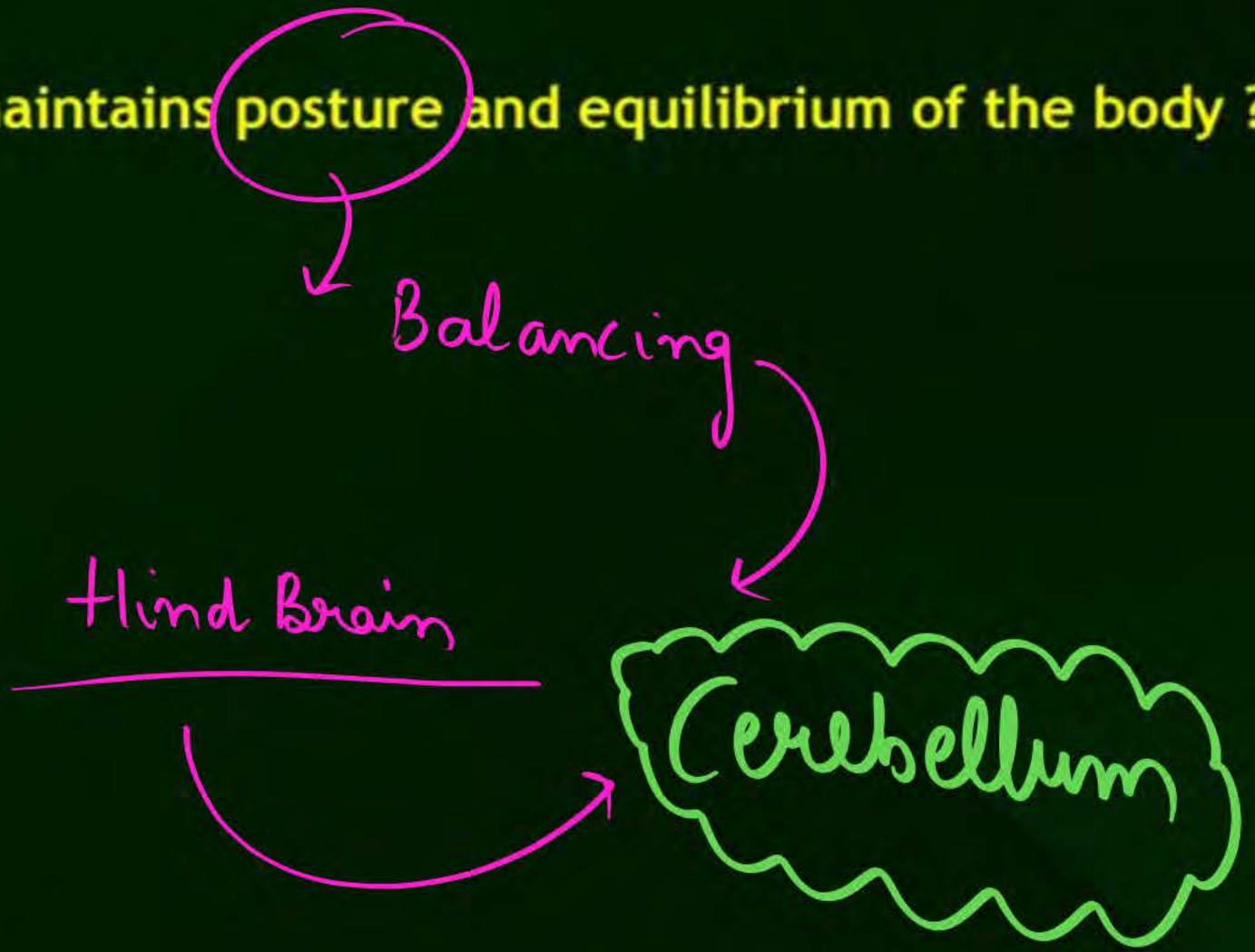
Answer

Solution:

Between the synapse between two neurons electric signals are converted into chemicals that can easily cross over the gap and pass on the chemical messenger to next neuron where it is converted back to electrical signal.

QUESTION-

Which part of the brain maintains posture and equilibrium of the body ?



Answer

Solution:

Cerebellum which is a part of the brain is responsible for Controls the motor functioning hence it is the part reengaged in the maintenance of posture and equilibrium of the body.

QUESTION-

How do we detect the smell of an agarbatti (incense stick)?

Stimuli → "Receptor"

Answer

Solution:

Smell of an agarbatti is detected by Nose, olfactory receptors present in the nose sends electrical signal to the fore brain.

Fore brain interprets this signal as the incense stick to be detected as smell.

QUESTION-

What is the role of the brain in reflex action?

Answer

Solution:

Reflex actions are formed instantaneously in response to the stimulus that has no time to think. For instance the sensory nerves that detect the heat are connected to the nerves that move the muscles of the hand. Such a connection of detecting the signal from the nerves (input) and responding to it quickly (output) is known as reflex arc.

Reflex action are generated in spinal cord and the information also reaches brain. This helps the brain to record this event and remember it for future use. Brain helps the person to get awareness of the stimulus and prevent himself from that situation again.

QUESTION-

What are plant hormones?

Chemical messenger

Solution:

Plant hormones are the organic substances produces at certain sites of the plant and are translocated to other parts based on the requirement. Plant hormones help to coordinate growth, development and responses to the environment.

Ex: Auxin ,
Gibberlins,
cytokinins,
abscisic acid
ethylene.

QUESTION-

How is the movement of leaves of the sensitive plant different from the movement of a shoot towards light?

Mimosa pudica

Tropic Movements

Nastic Movements

Sl. No.	Movement of leaves of the sensitive plant	Movement of a shoot towards light
1	Called as Nastic movement	Called as tropic movement
2	Not a growth movement	Growth movement
3	It does not depend on the direction of stimulus applied.	Depends on the direction of stimulus applied.
4	Touch is the stimulus	Light is the stimulus
5	Caused by the sudden loss of water from the swellings at the base of leaves	Caused by the unequal growth on the two sides of the shoot.
6	Occurs very fast	Occurs slowly

QUESTION-

Give an example of a plant hormone that promotes growth.

Solution:

Auxins and Gibberlin are the hormone responsible for the growth of plant.

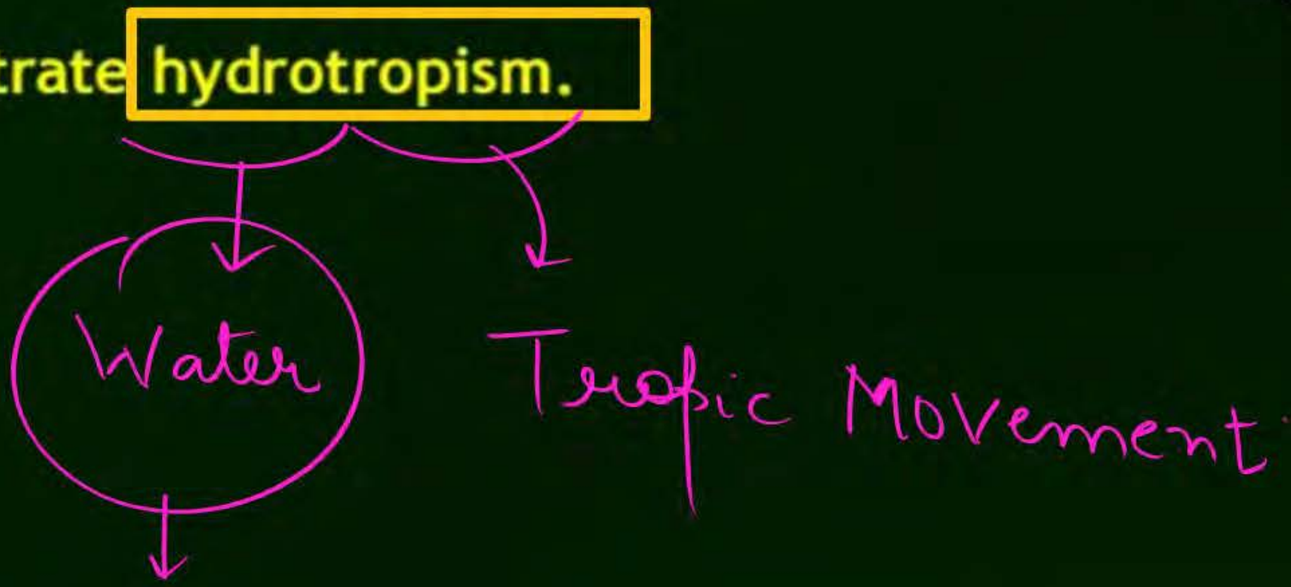
Auxins are responsible for the cell elongation in shoot and also regulates growth.

Gibberlin is responsible for stem elongation and germination.

Seed.

QUESTION-

Design an experiment to demonstrate **hydrotropism.**



Solution:

AIM:

To demonstrate hydrotropism in plants.

Procedure :

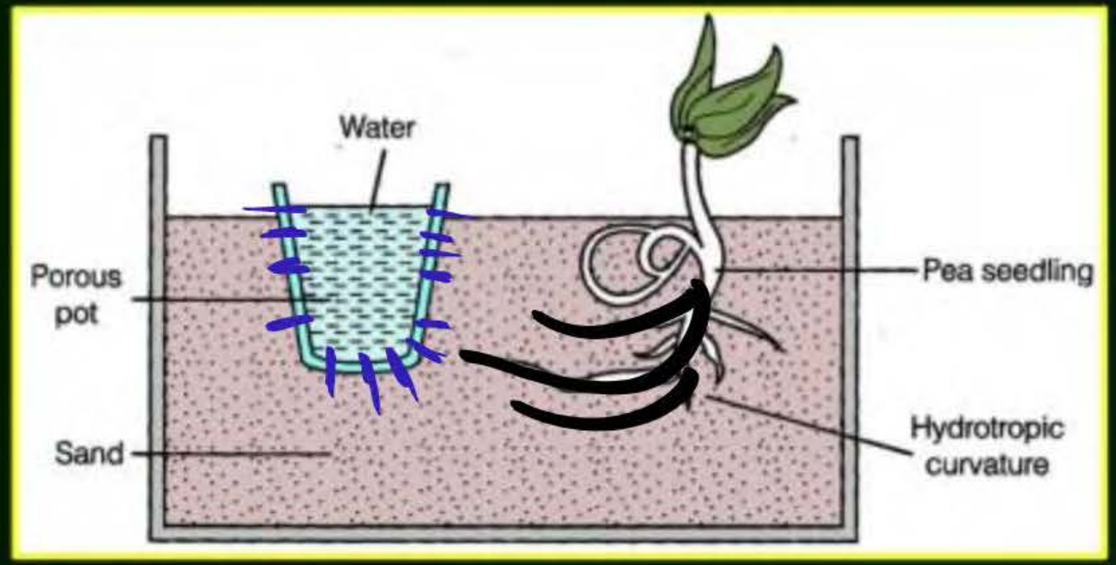
i. Plant a seedling in a vessel containing soil.

ii. Adjacent to the seedling put a porous pot containing water.

iii. Leave the set up for few days.

Observation :

iv. On examining the roots it is observed that the roots bend towards the source of water and do not grow straight.



Result :

It confirms that plant shows hydrotropism as the roots bend towards the porous pot of water. As hydrotropism is a plant growth response in which the direction of growth is determined by a stimulus of gradient in water concentration.

QUESTION-

How does chemical coordination take place in animals?

[NCERT Exemplar]

Hormones

Answer

Endocrine glands → Hormones.

Solution:

Chemical coordination takes place in animals with the help of chemical messengers called as Hormones. Hormones are the chemic fluids that are secreted by specific glands of the endocrine gland. Hormones regulate the growth, development and homeostasis of the animals.

QUESTION-

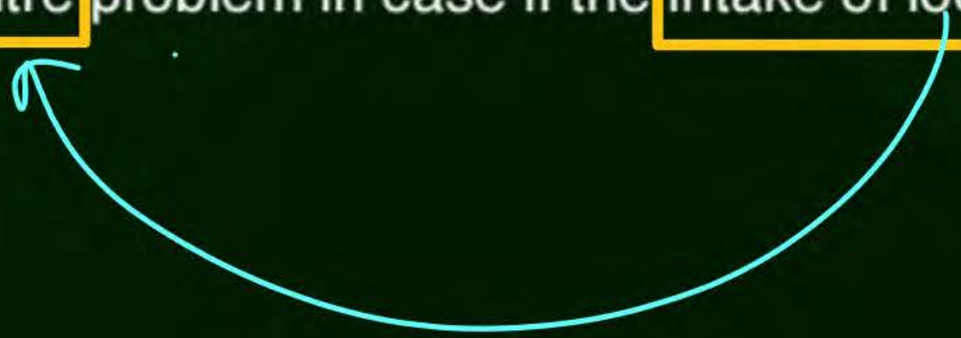
Why is the use of iodised salt advisable? [CBSE 2019(31/2/1)]

Answer

Solution:

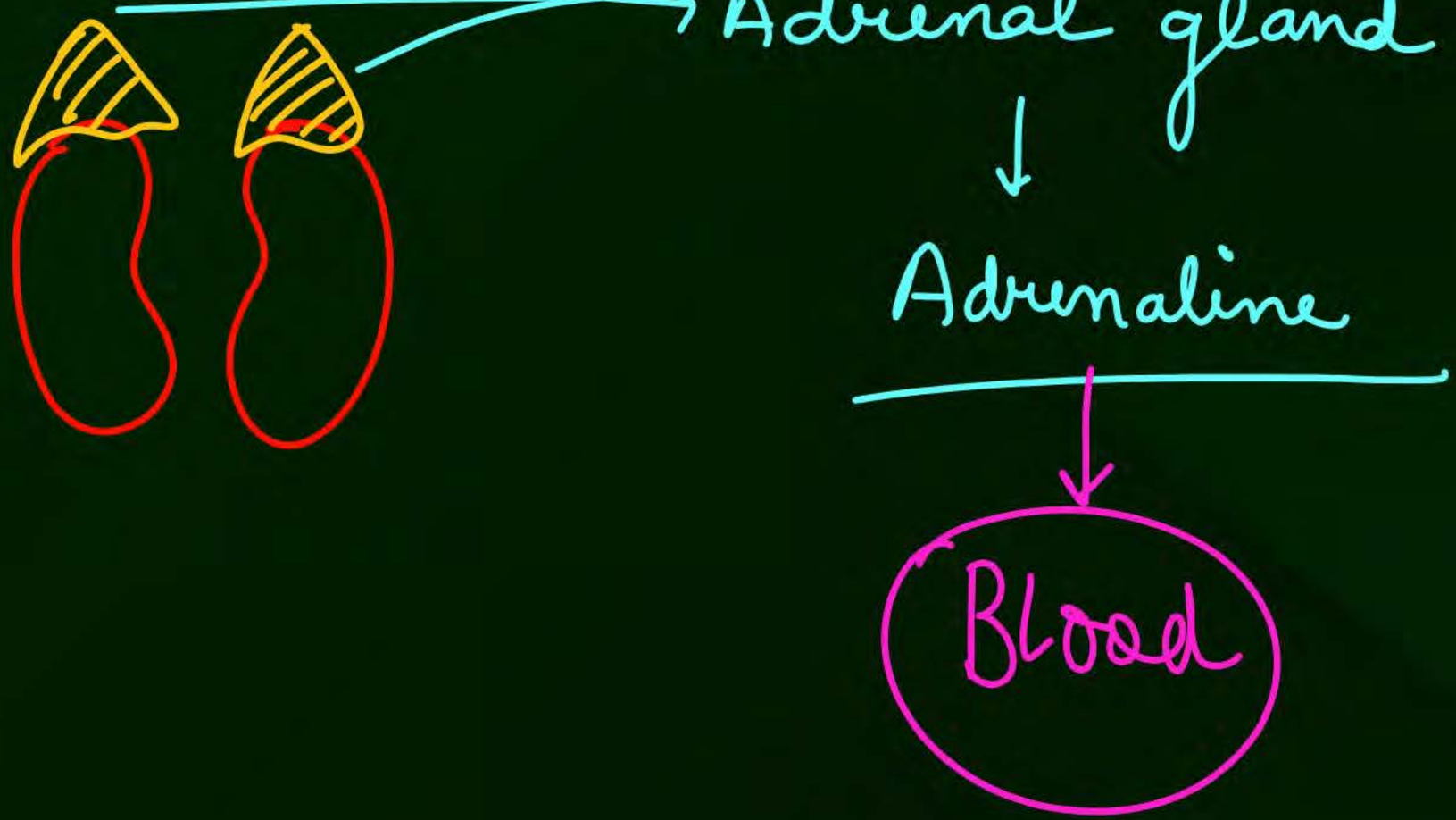
Usage of lodized salt is advisable to avoid the deficiency of lodine. If the intake of iodine is low, the release of thyroxine from the thyroid gland will be decreased. This affects fat, carbohydrate and protein metabolism.

Thus a person may have goitre problem in case if the intake of iodine is decsreased.



QUESTION-

How does our body respond when adrenaline is secreted into the blood?



Answer

Solution:

Adrenaline is a hormone secreted when a person is frightened or mentally disturbed. When Adrenaline reaches heart, heartbeat will increase to increase blood supply to our muscles. Adrenaline also increases the breathing rate because of contraction of diaphragm and the rib muscles. Adrenaline rush also increases blood pressure and allows entry of more glucose into blood. These altogether occurs when our body respond to secretion of adrenaline into our blood.

QUESTION-

Why are some patients of diabetes treated by giving injections of insulin?

[CBSE 2019 (31/3/2)]

Increased level of blood glucose (sugar).

Answer

Solution:

Diabetes is a condition where insulin hormone is produced less or stopped by pancreatic cells of a person. Insulin regulates blood glucose by converting extra glucose to glycogen. When insulin is not produced adequately person blood glucose level which leads to adverse effects. In order to maintain the insulin and blood glucose level diabetes patients are treated with injections of insulin.

EXERCISE QUESTIONS

QUESTION-

Which of the following is a plant hormone?

A Insulin

B Thyroxine

C Oestrogen

D Cytokinin

→ Animal hormone

Answer

Ans. (D) Cytokinin

QUESTION-

The gap between two neurons is called a

A dendrite

B synapse

C axon

D impulse

Answer

Ans. (B) Synapse

QUESTION-

The brain is responsible for

A thinking

B regulating the heartbeat

C balancing the body

D all of the above

Answer

Ans. (D) All of the above

QUESTION-

To recieve a Stimulus.

What is the function of receptors in our body? Think of situations where receptors do not work properly. What problems are likely to arise?

Answer

Solution:

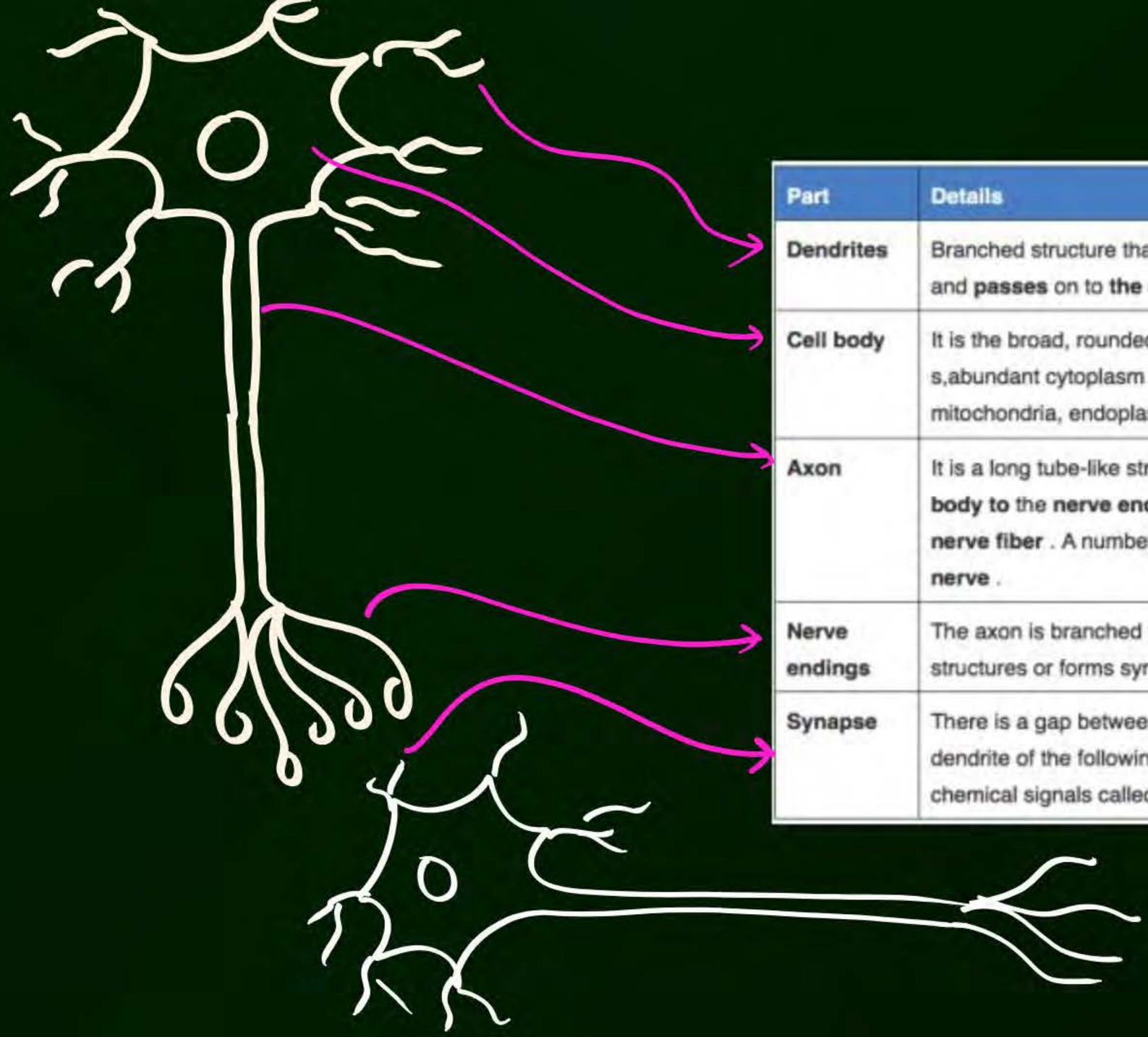
Receptors are present throughout our body mainly sense organs. Receptors collect the information about changes that happen around us and send the signal to information to brain which render effector mechanism against the change. When receptors do not work properly, the environmental stimuli are not able to create nerve impulses and body does not respond.

For example, if our gustatory receptors located in the tongue do not work properly we will not perceive the taste of food such as sour, sweet, salty or bitter.

QUESTION-

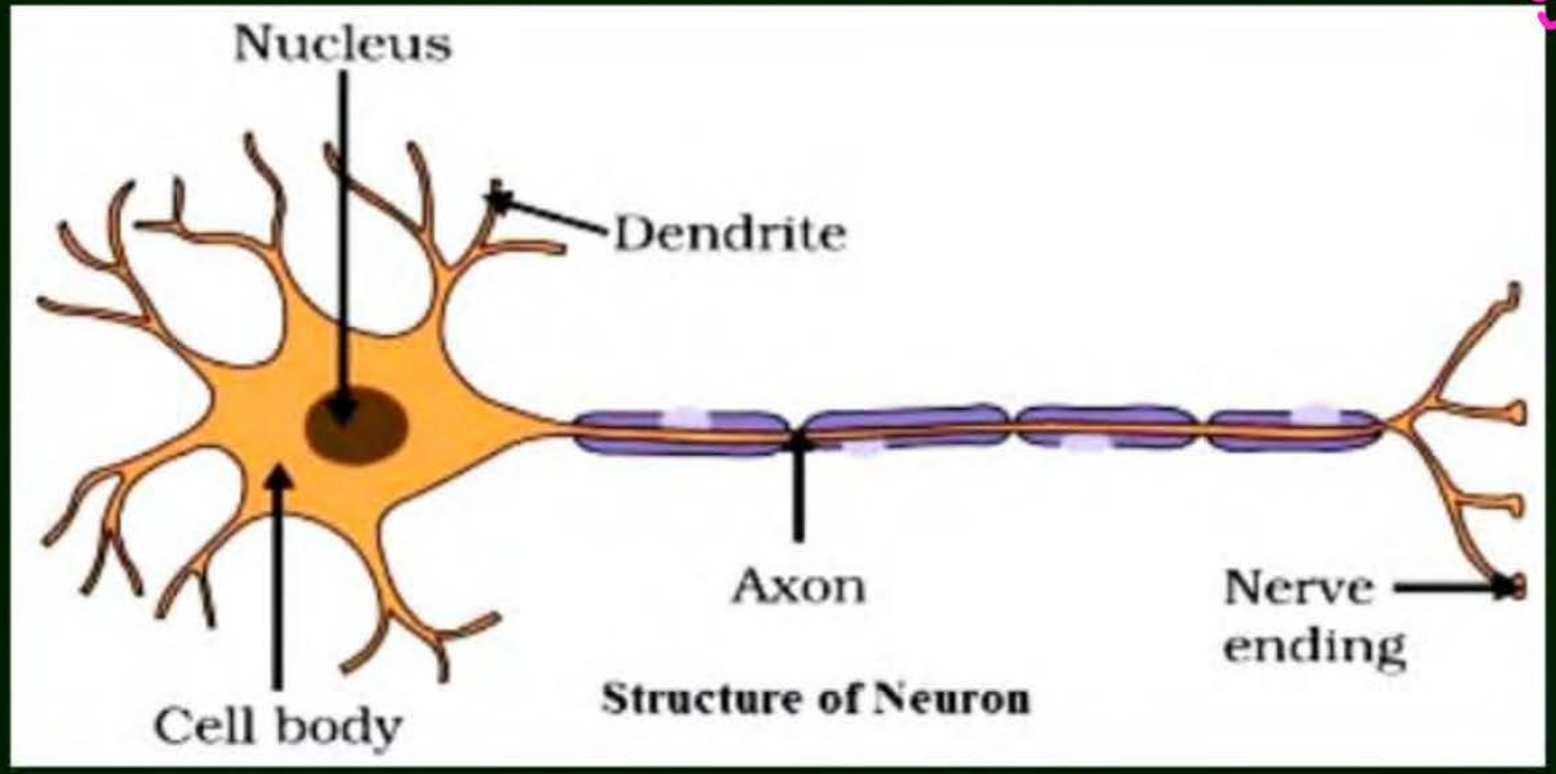
Draw the structure of a neuron and explain its function.

[NCERT Exemplar]



Part	Details
Dendrites	Branched structure that **collects information** from previous neuron and **passes** on to **the cell body** .
Cell body	It is the broad, rounded part of the neuron that contains the **nucleu** s,abundant cytoplasm (**neuroplasm**) and other **organelles** like mitochondria, endoplasmic reticulum, Golgi body etc.
Axon	It is a long tube-like structure that **carries information** from the **cell body to** the **nerve endings** . Axon is covered by 1-2 sheaths called **nerve fiber** . A number of nerve fibers joined together to form a **nerve** .
Nerve endings	The axon is branched terminally in muscle fibers, glands, other structures or forms synapse with the dendrites of other neurons.
Synapse	There is a gap between the nerve endings of one neuron and dendrite of the following neuron where signals are transmitted as chemical signals called **neurotransmitters.**

Parts of a Neuron / Nerve cell

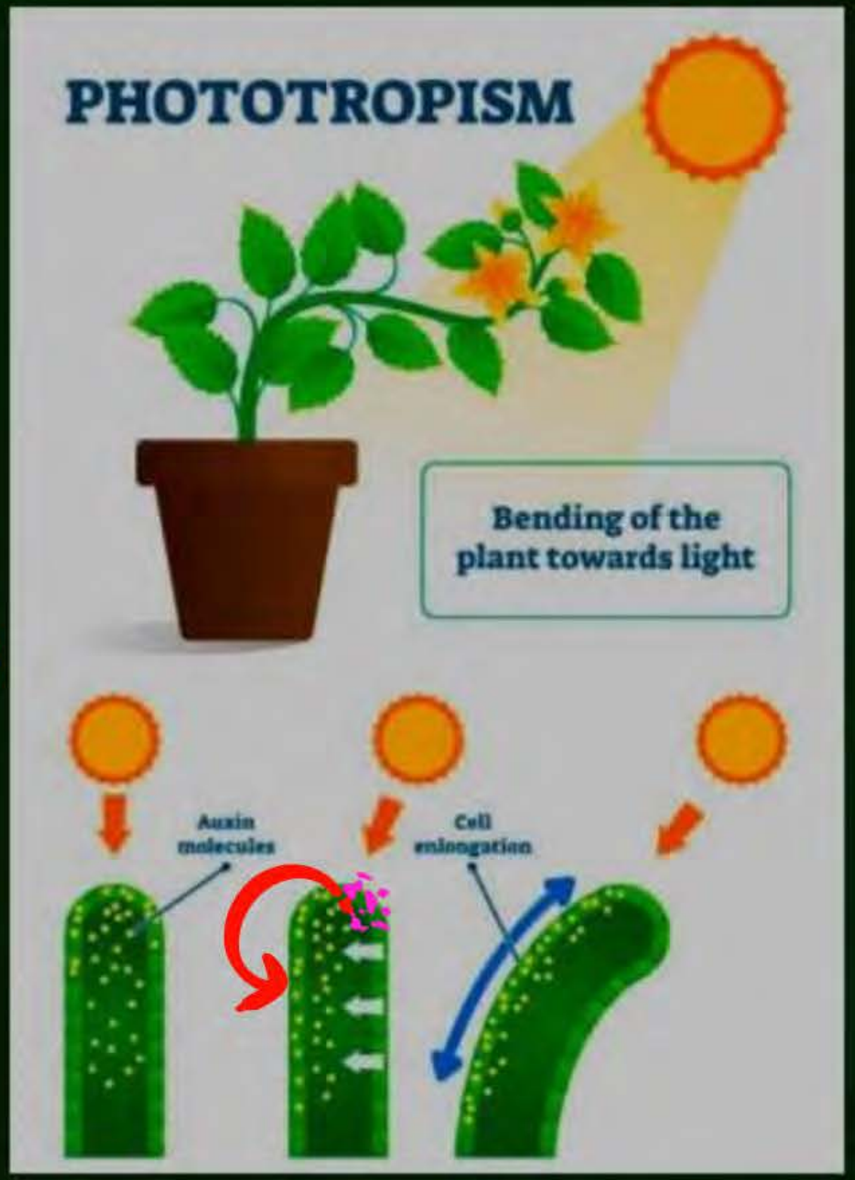


QUESTION-

How does phototropism occur in plants?

Auxin → Cell Elongation

AUXin



Answer

The directional and growth related movement of a plant part/plant in response to light is called phototropism. The shoot responds by bending towards light while roots respond by bending away from the light. Phototropism occurs it due to the action of auxin hormone. This happens as follows:

(i) When sunlight falls on the plant, the auxin hormone present at the tip of the stem spreads uniformly down the stem. Due to the equal presence of auxin, both the sides of the stem grow straight and with same rapidity.

(ii) When the light falls only on the right side of the stem, then the auxin hormone collects in the left side of the stem, away from the light. This is because auxin hormone prefers to stay in shade, i.e., moves away from the light. Thus, more auxin hormone is present in the left side of stem as compared to the right. The left side of stem, grows faster than its right side and therefore, the stem bends towards the right side (direction of light).

QUESTION-

Which signals will get disrupted in case of a spinal cord injury?

Answer

Signals → Receptors

Spinal Cord

Solution:

In case of a spinal cord injury, signals coming from the nerves as well as the signals coming to the receptors will be disrupted. Both these signals meet in the spinal cord. Hence, both these signals get disrupted.

Brain

Reflex Actions will be affected

QUESTION-

How does chemical coordination occur in plants?

↓

Hormones

Answer

Solution:

Plant growth, development and responses to the environment is controlled and coordinated by a special class of chemical substances known as hormones. Hormones are produced in one part of the plant and are transported to all the needy parts of the plant. The five major types of phytohormone are auxins, gibberellins, cytokinins, abscisic acid, and ethylene.

These phytohormones are either growth promoters (such as auxins, gibberellins, cytokinins, and ethylene) or growth inhibitors such as abscisic acid.

QUESTION-

What is the need for a system of control and coordination in an organism?

Answer

The body of a multicellular organism consists of a number of components and
sub-components and each is specialised to perform a particular function. Therefore, it is necessary that various organs of the body of an organism work together in a proper manner to carry out various functions and respond to stimuli. In human beings, nervous system and endocrine system work together to control and coordinate.

QUESTION-

How are involuntary actions and reflex actions different from each other?

Answer

Solution:

Reflex actions	Involuntary actions
1. Rapid automatic responses to a stimulus without the conscious involvement of the brain	1. Occurs without the consciousness of an organism
2. Controlled by spinal cord	2. Controlled by mid brain or medulla Oblongata
3. Very quick and instantaneous	3. Relatively slower
4. May involve any muscle or a gland	4. Involves only smooth muscles
Examples: Blinking of eyes, salivation	Examples: Beating of heart, blood circulation

QUESTION-

Compare and contrast nervous and hormonal mechanisms for control and coordination in animals.

Answer

	Nervous control		Hormonal Control
1.	It is consist of nerve impulses between PNS, CNS and Brain.	1.	It consists of endocrine system which secretes hormones directly into blood.
2.	Here response time is very short.	2.	Here response time is very long.
3.	Nerve impulses are not specific in their action.	3.	Each hormone has specific actions.
4.	The flow of information is rapid.	4.	The flow of information is very slow.

QUESTION

What is the difference between the manner in which movement takes place in a sensitive plant and the movement in our legs?

Nastic Movement

Walk.

Answer

Movement in Sensitive Plant	Movement in Legs
1. It occurs in response to an external stimulus like touch.	1. It occurs in response to our requirement and is determined by will.
2. Plant cells change shape by changing the amount of water.	2. Movement in our legs is a voluntary action which is controlled by brain
3. No nerves are involved.	3. Nerves carry the message for movement of legs.

THANK YOU

Bachchon