

CONTROL AND CO-ORDINATION

WORKSHEET - 4

CLASS 10

1. How does phototropism occur in plants?

Solution

The growth movement in plants in response to light stimulus is known as phototropism. The shoots show positive phototropism and the roots show negative phototropism. This means that the shoots bend towards the source of light whereas the roots bend away from the light source.

Some examples of phototropism are as follows:

- (a) The flower head of sunflower is positively phototropic and hence it moves from east to west along with the sun.
- (b) The ovary stalk of groundnut is positively phototropic before fertilization and becomes negatively phototropic after fertilization, so that the fruit is formed underground.

2. What are phytohormones? (plant hormones). What are their major types in plant?

Solution:

Phytohormones

In plants, growth, development, and response to the environment is controlled and coordinated by a special class of chemical substances known as phytohormones. These hormones are produced in one part of the plant body and are translocated to other parts.

i) Auxins

auxins are the plant hormones which promote cell enlargement & cell differentiation in plants. It also promote fruit growth. Auxin hormone controls the plant's response to light and gravity. When the growing parts of a phototropic plant detect sunlight, auxins (synthesized at the shoot tips) help the cells grow longer. When light falls on one side of the plant, the auxins generally diffuse towards the shaded side of the shoot. This stimulates the cells in the shaded area to grow longer than the corresponding cells of the illuminated region. This results in the curvature of the plant stem tip towards the light.

ii) Gibberellins

They are produced in the roots of a plant. They promote stem elongation by promoting cell division in the inter-nodal region.

iii) Cytokinins

They promote cell division. Therefore, they are present in greater concentration in those areas of the plants where rapid cell division occurs. For example, tip of the shoot. It also promote the opening of stomata and also promote fruit growth.

iv) Abscisic acid

It promotes seed dormancy by inhibiting cell growth. It is involved in the opening and closing of stomata. It is also responsible for the shedding of leaves and cause detachment of lower and fruits from the plant.

3. Draw the structure of a neuron and explain its function.

Solution

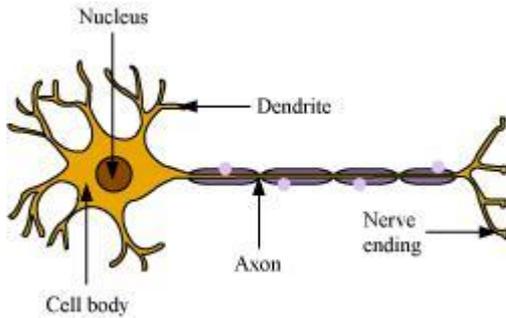
Neurons are the functional units of the nervous system. The three main parts of a neuron are axon, dendrite, and cell body.

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Structure of a neuron

Functions of the three parts of a neuron:

Axon: It conducts messages away from the cell body.

Dendrite: It receives information from axon of another cell and conducts the messages towards the cell body.

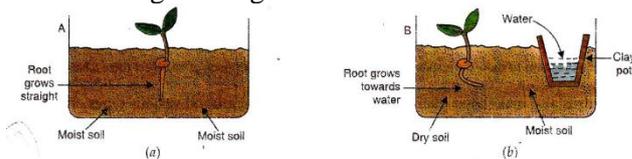
Cell body: It contains nucleus, mitochondria, and other organelles. It is mainly concerned with the maintenance and growth.

The information acquired at the end of the dendritic tip of a nerve cell sets off a chemical reaction that creates an electric impulse. This travels from the dendrite to the cell body, and then along the axon to its end. At the end of the axon, the electrical impulse sets off the release of some chemicals called neurotransmitters. These chemicals cross the gap. A similar type of synapse finally allows delivery of such impulses from neurons to other cells, such as muscle cells or glands. Nervous tissue is made up of an organized network of cells or neurons, and is specialized for conducting information via electrical impulses from one part of the body to another.

4. Describe an experiment to show the response of a plant to water.

Solution

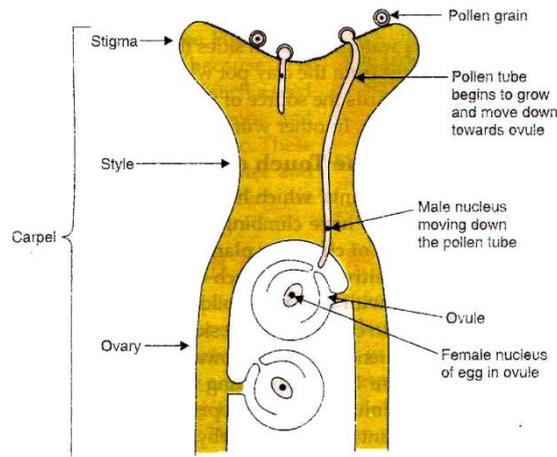
We take two glass troughs A and B and fill each one of them two-thirds with soil. In trough A we plant a tiny seedling. In trough B we plant a similar seedling and also place a 'clay pot' inside the soil. Water the soil in trough A daily and uniformly. Do not water the soil in trough B but put some water in the clay pot buried in the soil. Leave both the troughs for a few days. Now, dig up the seedlings carefully from both the troughs without damaging their roots. We will find that the root of the seedling in trough A is straight. On the other hand, the root of the seedling in trough B is found to be bent to the right side.



5. Explain Chemotropism with example.

Solution

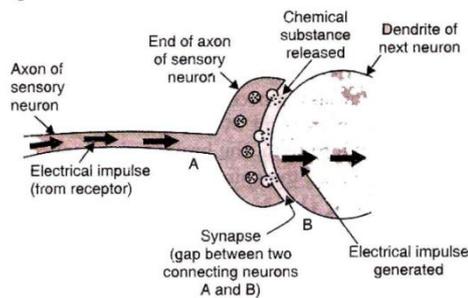
The growth of plant parts due to a chemical stimulus is known as chemotropism. The growth (or movement) of a pollen tube towards the ovule induced by a sugary substance as a stimulus, is an example of chemotropism. This can be explained as follows: the stigma in the carpel of a flower secretes a chemical substance (which is a sugary substance) into the style towards the ovary. This sugary substance acts as a stimulus for the pollen grains which fall on the stigma of the carpel. The pollen grain responds to this stimulus by growing a pollen tube in the downward direction into the style of the carpel and reaches the ovule in the ovary of the flower for carrying out fertilization. This growth of the pollen tube in response to a chemical substance secreted by the stigma of a flower is an example of chemotropism.



6. Explain how nerve impulses are transferred from one neuron to another in the nervous system.

Solution

Any two neurons in the nervous system do not join to one another completely. There is always a very, very small gap between the two neurons. This gap is called a synapse. The nerve impulses are carried over this small gap between a pair of neurons by means of a chemical substance called neurotransmitter substance. A microscopic gap between a pair of adjacent neurons over which nerve impulses pass when going from one neuron to the next is called a synapse.

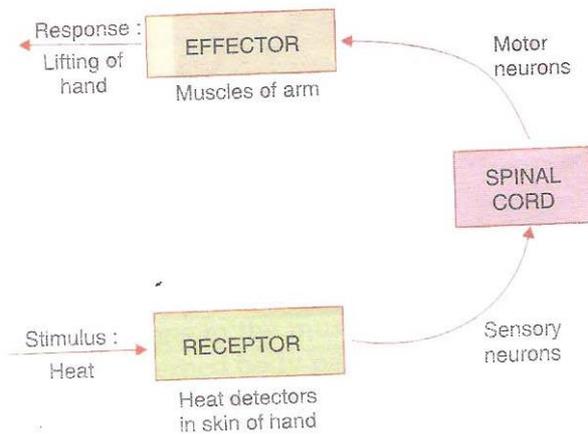


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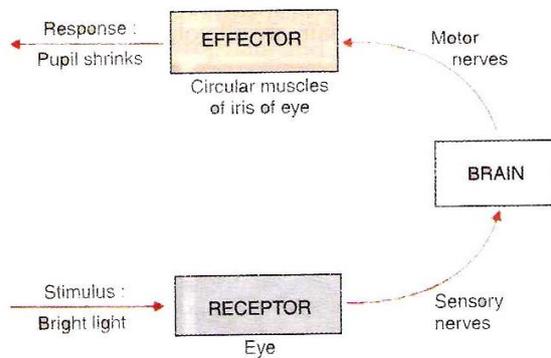
7. What are spinal reflexes and cerebral reflexes.

Solution

The reflexes which involve only the spinal cord are called spinal reflexes. Though spinal reflexes are produced in the spinal cord but the message of reflex action taken also goes on to reach the brain. When we lift a hot plate, then along with heat, the pain produced by heat also acts as a 'stimulus'. Those reflexes action which involve brain are called cerebral reflexes cerebral reflexes occur in the organs present in the head because these organs are directly connected to the brain. Our eyes are present in the head. In dim light, the pupil is large so that more light can enter into the eye and make see properly even in dim light. Now, when a bright light shines into our eye, then the pupil of our eye automatically becomes smaller. The contraction of pupil of our eye automatically in the presence of bright light is an example of cerebral reflex.



SPINAL REFLEXES



CEREBRAL REFLEXES

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8. What is spinal cord? What is its main function?

Solution

Spinal cord has a cylindrical structure. The spinal cord begins in continuation with medulla and extends downwards. It is enclosed in a bony cage called vertebral column. Spinal cord is also surrounded by membranes called meninges. As many as 31 pairs of nerves arise from the spinal cord. The spinal cord is concerned with spinal reflex actions and the conduction of nerve impulses to and from the brain. The various functions of brains are as follows:

1. The brain receives information-carrying nerve impulses from all the sensory organs of the body.
2. The brain responds to the impulses brought in by sensory organs by sending its own instructions to the muscles and glands causing them to function accordingly.
3. The brain correlates the various stimuli from different sense organs and produces the most appropriate and intelligent response.
4. The brain coordinates the body activities so that the mechanisms and chemical reactions of the body work together efficiently.
5. The brain stores 'information' so that behavior can be modified according to the past experience. This function makes the brain the organ of thought and intelligence.

9. What is a cerebrospinal fluid? What is its function?

Solution

The fluid which fills the space between the membranes which cover the brain is called cerebrospinal fluid.

Function: it protects the brain from mechanical shocks.

10. Give a reason to explain why?

- i) Adrenaline helps in dealing emergency situations?**
- ii) Secretions of growth hormone should be specific in the human body?**

Solution

- i) Adrenaline increases the heart beat and breathing rate which results in the supply of more oxygen to muscles. It reduces the blood to the digestive system and skin, as a result the blood is further diverted to skeletal muscles. All these responses together prepare the body to deal with the emergency situations.
- ii) If growth of hormone secreted in excess during childhood then it leads to gigantism while the less secretion of this hormone during childhood causes dwarfism.

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