Chapter 7-12: Plant Hormones

Hormones are chemical substances that regulate the activities of living things. In humans, hormones are produced by glands such as the thyroid, pituitary, and adrenal. Plants also produce hormones, but they do not possess specific hormone-producing organs.

In plant tissues, hormones regulate growth and development. The cells affected by hormones are known as target cells. Hormones bring about physiological changes by inhibiting or stimulating the metabolic activities of target cells. This plate will discuss five plant hormones.

This plate contains an illustration of a typical plant, which includes roots, stems, leaves, and fruit. You should color the plant with light and medium colors. The main focus of this plate will be on the arrows that designate where the various hormones act. These arrows should be colored in bold reds, greens, and blues to indicate their importance.

The effect of plant hormones on their target cells is slow in contrast to the speed of many animal hormones. Most hormones are manufactured in meristematic tissues and are transported by the phloem.

The first group of hormones we will discuss are the **auxins (A)**; you should color the arrow for auxin a bold color. Auxins determine to what degree a plant will bend toward the light (this phenomenon is called phototropism), and they also stimulate cell elongation. Several auxins are known to exist, including indoleacetic acid and phenylacetic acid; both of which are relatively simple compounds.

Auxins also act to delay abscission, which is the process through which leaves fall from a plant. When auxins are in short supply, leaves drop more easily because the petiole weakens where the leaf joins the stem. A decrease in auxins also causes fruit to drop from the plant.

The second hormones we will discuss are the **gibberellins (B)**, hormones that promote the elongation of the stem as well as the process of cell division. There are sixty-five known gibberellins.

We have now examined two hormones produced by plants and have described their function in plant development. In the next section we will turn to a third group of hormones. Continue reading and using bold colors for the arrows.

The third group of plant hormones presented here is the **cytokinins (C)**, which also induce cell division. In the plate we show cytokinins in the fruit of the plant, because they also stimulate fruit development and play a part in maintaining a balance between the development of the stem and root.

Cytokinins work with auxins to regulate plant growth and development. An overabundance of either hormone produces a plant that's out of balance because unregulated cell differentiation and development occur. One example of a cytokinin is kinetin.

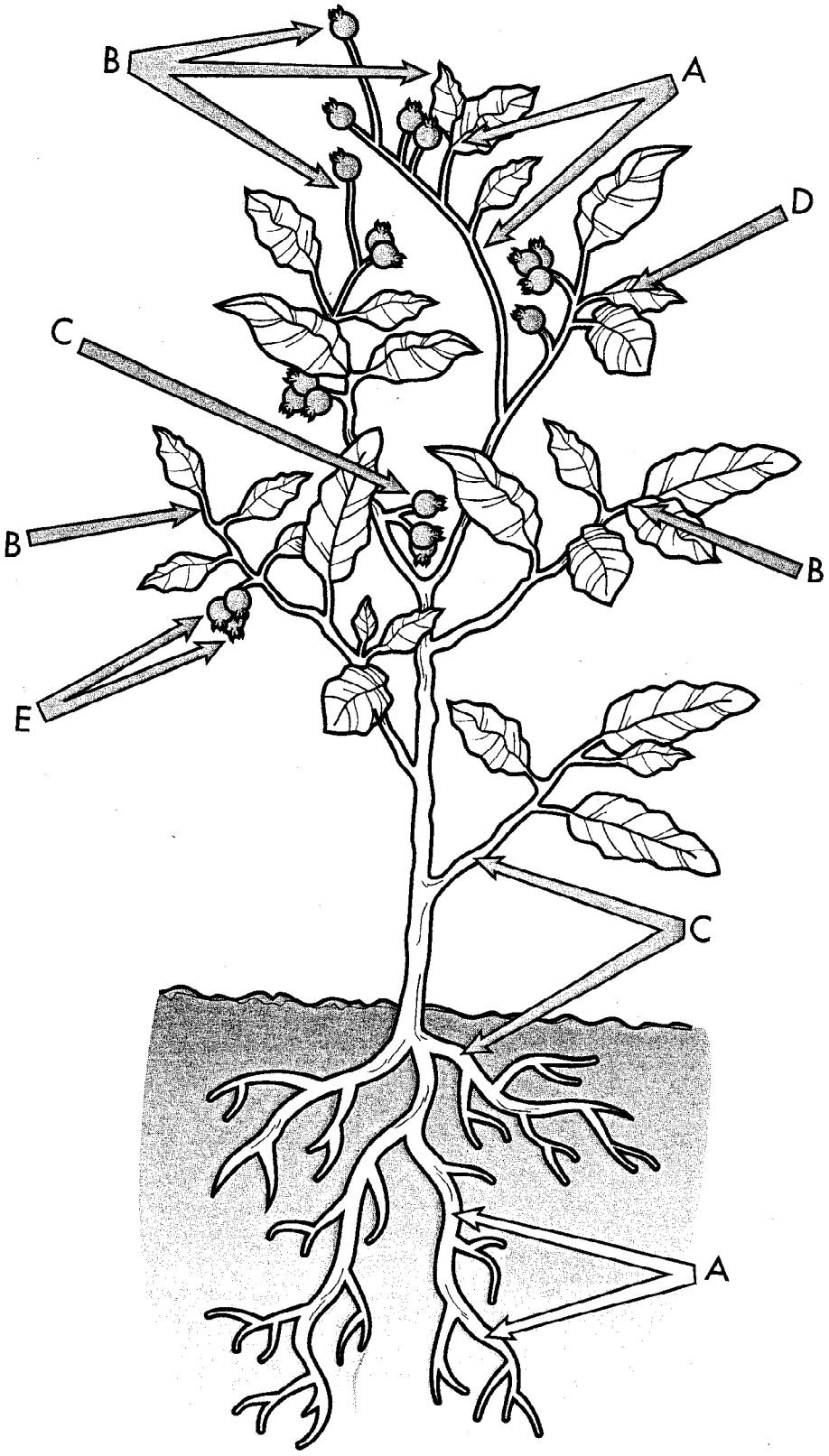
We will now look at the fourth hormone, **abscisic acid (D)**, which is responsible for the closing of stomata on the undersides of leaves. Water passes through the stomata during transpiration, and abscisic acid works to control the opening and closing of the guard cells surrounding the stomata.

Abscisic acid also stimulates the formation of winter buds by converting primitive leaves into bud scales, which puts the plant into its dormant state. The effects of abscisic acid are counterbalanced by the effects of gibberellins.

We have now surveyed four plant hormones. Notice that hormones work broadly to influence physiological activities such as cell division, growth, and elongation. We will conclude this plate by focusing on the fifth hormone.

The last hormone we will discuss is **ethylene (E)**, which functions during the ripening of fruit, as the arrow indicates. It is a simple chemical compound that regulates the growth of fruit cells to stimulate ripening. The hormone causes spoiling fruit to liberate ethylene in abundance, causing fruit situated close to it to ripen.

Ethylene also influences sex determination in some plants. In certain species, ethylene increases the number of female flowers, to make fertilization more likely. In this way, ethylene regulates and stimulates many developmental and metabolic activities in plants.



Plant Hormones

- ○ Auxins .....A
- ○ Gibberellins .....B
- ○ Cytokinins C
- ○ Abscisic Acid.....D
- ○ Ethylene .....E