

Sensory Systems in Plants

1. If temperatures suddenly rise 5 to 10° C, _____ proteins are produced to help stabilize other proteins.
2. Rapid turgor pressure changes in specialized multicellular swellings called _____ are associated with leaves that move in response to touch or light.
3. Mature plants may become _____ in dry or cold seasons in order to survive long periods that are unfavorable for growth.
4. _____ are chemical substances produced in small quantities in one part of an organism and then transported to another part of the organism, where they bring about physiological responses.
5. The hormone _____ has a more pronounced role in stem elongation if auxin is also present.
6. _____ are complex carbohydrates that are released from plant cell walls and appear to regulate both pathogen responses and growth and development in some plants.
7. _____ are directional growth responses of plants to a unidirectional source of light.
8. _____ is pressure within a living cell resulting from diffusion of water into it.
9. The plant hormones known as _____ are structurally similar to animal steroid hormones.
10. Which of the following traits is not descriptive of brassinosteroids?
 - A. They were first discovered in pollen.
 - B. They are released from the cell wall by enzymes secreted by pathogens.
 - C. Their functions overlap with those of auxins.
 - D. Their functions overlap with those of gibberellins.
 - E. They may have evolved before the evolutionary divergence of plants and animals.
11. Which of the following statements about gravitropism is false?
 - A. Shoots exhibit negative gravitropism.
 - B. Amyloplasts play a role in perceiving gravity.
 - C. Gravitropic responses are evident at germination.
 - D. Ethylene is important in plants' responses to gravity.
 - E. In roots, the gravity-sensing cells are located in the root cap.
12. Cytokinins are related to or derived from the purine base
 - A. adenine
 - B. thymine
 - C. guanine
 - D. cytosine
 - E. uracil

13. The gaseous hormone that stimulates the ripening of fruits is known as
- A. abscisic acid
 - B. gibberellin
 - C. indoleacetic acid
 - D. ethylene
 - E. cytokinin
14. Abscisic acid suppresses growth of buds and promotes leaf
- A. lengthening
 - B. senescence
 - C. rolling
 - D. color change
 - E. development
15. Which of the following statements about phytochrome is true?
- A. It exists in two interconvertible forms.
 - B. P_R absorbs red light.
 - C. P_{FR} is biologically inactive.
 - D. a, b, and c
 - E. only a and b
16. Red light is involved in all of the following plant growth responses except
- A. thigmotropic responses
 - B. inhibition of seed germination
 - C. elongation of etiolated shoots
 - D. signals for the distance between plants
 - E. photomorphogenesis
17. Which do the following choices is not one of the steps that lead to a gravitropic response in plants?
- A. Signals form in the cell that perceives the stimulus.
 - B. Differential cell elongation occurs.
 - C. Cytokinin accumulates unevenly on opposite sides of the stem or root, causing the bending in response to gravity.
 - D. A signal is transduced intra- and inter-cellularly.
 - E. Gravity is perceived by the cell.
18. Which of the following statements about hormones is false?
- A. They are chemical substances produced in the organism.
 - B. They are produced in small, often minute quantities.
 - C. They are produced in one part of the organism and transported to another.
 - D. Their effect is not dependent on the nature of the tissue.
 - E. They can stimulate certain physiological processes while inhibiting others.

19. Which of the following is not one of the seven major kinds of plant hormones?
- A. auxin
 - B. nitrogen oxide
 - C. cytokinin
 - D. gibberellin
 - E. ethylene
20. The elongation of stems is stimulated by
- A. auxin only
 - B. gibberellin only
 - C. ethylene only
 - D. auxin and gibberellin
 - E. auxin and ethylene
21. When Darwin covered the tip of a grass seedling with metal foil and then illuminated it from one side, the seedling
- A. bent away from the light
 - B. failed to grow toward the light
 - C. grew toward the light, as expected
 - D. waved back and forth
 - E. wilted and died
22. One effect of auxin, which brings about the elongation of cells, is to change cell walls by increasing their
- A. permeability
 - B. plasticity
 - C. stiffness
 - D. thickness
 - E. water solubility
23. Which of the following actions is not a major function of auxins?
- A. inhibition of leaf abscission
 - B. promotion of seed germination
 - C. stimulation of the elongation of cells by acting on cell walls
 - D. stimulation of the formation of roots on cuttings
 - E. promotion of the activity of the vascular cambium
24. A compound similar to auxin, 2,4,5-trichlorophenoxyacetic acid (2,4,5-T), has been used as
- A. a fertilizer for corn and wheat
 - B. a spray to promote flowering of pineapple
 - C. an organic substitute for chlorine bleach
 - D. a substitute for the toxic agent dioxin
 - E. an herbicide for killing weeds and woody seedlings

25. Which of the following are characteristics of cytokinins?
- A. They stimulate cell division and determine the course of differentiation.
 - B. They inhibit growth of lateral roots.
 - C. They are related to or derived from adenine.
 - D. b and c
 - E. a, b, and c
26. Gibberellins were first identified in
- A. rice
 - B. apples
 - C. bananas
 - D. tomatoes
 - E. grapes
27. Coconut milk was an extremely useful growth supporter of plant cell culture because, in addition to amino acids, it contains
- A. auxins
 - B. gibberellins
 - C. cytokinins
 - D. ethylene
 - E. abscisic acid
28. Gibberellins are characterized by all of the following except
- A. they are produced in the apical regions of shoots and roots
 - B. they promote stem elongation
 - C. they can restore normal growth and development to certain dwarf mutants
 - D. they hasten seed germination
 - E. they act as amylases and other hydrolytic enzymes
29. The plant hormone with the simplest chemical structure is
- A. auxin
 - B. abscisic acid
 - C. cytokinin
 - D. ethylene
 - E. gibberellin
30. Ethylene plays a number of roles in plants, including all of the following, except
- A. retarding stem and root elongation
 - B. hastening the ripening of fruits
 - C. increasing the storage life of apples, bananas, and oranges
 - D. accelerating the loss of damaged leaves and fruits
 - E. retarding lateral bud growth

31. Which of the following statements about abscisic acid is false?
- A. It is produced chiefly in mature green leaves and in fruits.
 - B. It stimulates the growth of dormant buds.
 - C. It promotes leaf senescence.
 - D. It plays an important role in controlling the opening and closing of stomata.
 - E. It plays a role in seed dormancy.
32. The naturally-occurring plant hormone that has a major role in the phototropic response of plants is
- A. auxin
 - B. gibberellin
 - C. abscisic acid
 - D. ethylene
 - E. 2, 4-D
33. The directional growth response of plants to touch is called
- A. phototropism
 - B. gravitropism
 - C. thigmotropism
 - D. photoperiodism
 - E. stimulitropism
34. Plants have an endogenous method to keep their movements and other responses synchronized with the environment. This is known as
- A. purine monitoring
 - B. NAA tracking
 - C. a circadian clock
 - D. auxin cycling
 - E. gravitropism
35. The acid-growth hypothesis links
- A. oligosaccharins to pH changes
 - B. cytokinin to thigmonasty
 - C. auxin to cell wall expansion
 - D. gibberellin to root elongation
 - E. ethylene to leaf abscission
36. Turgor movements in plants are responsible for all of the following actions except
- A. reversible changes in water pressure within plant cells
 - B. reduction of water loss from transpiration
 - C. enabling leaves to photosynthesize more efficiently
 - D. flowers that open during the day and close at night
 - E. inducing changes in the active form of phytochrome

37. Select the tropism that is not correctly matched with its meaning.
- A. phototropism—response to light
 - B. gravitropism—response to gravity
 - C. thigmotropism—response to touch
 - D. thermotropism—response to temperature
 - E. aerotropism—response to carbon dioxide
38. A viticulturist's presentation on growing and managing grapes stated that it is imperative to encourage the grapevine's natural tendency of positive thigmotropism. He means
- A. to encourage the vine's response to move toward the early morning light as opposed to the late afternoon sun
 - B. to encourage the roots to grow deeper and spread out
 - C. to encourage the grapes to retain their sugar for a longer period of time
 - D. to encourage the twining stems to wrap around the supporting wires
 - E. to encourage the self-pruning activity that is natural to grapevines
39. Which of the following plant hormones promotes fruit ripening?
- A. ethylene
 - B. gibberellin
 - C. cytokinin
 - D. auxin
 - E. abscisic acid
40. Cytokinins promote cell division and differentiation in plant tissues, but only in the presence of another plant hormone. The other hormone is
- A. auxin
 - B. ethylene
 - C. abscisic acid
 - D. gibberellin
 - E. oligosaccharin
41. Several scientists, including Charles and Francis Darwin, Frits Went and others, demonstrated that auxins caused stems to bend toward light. These researchers conducted elaborate studies of this phenomenon. Went was the researcher who finally determined that bending of the stem toward light was a result of
- A. a greater auxin concentration on the lighted side of the plant stem causing stem elongation and thus a bending in the direction of the light
 - B. a greater auxin concentration on the shaded side of the plant stem causing stem elongation and a bending in the direction of the light
 - C. auxin concentration being equal on both sides (lighted and shaded); however, the apical meristem responded to the presence of light
 - D. a combination of positive phototropism and a negative gravitropism
 - E. the stem's response to the agar blocks that had been used in the experimental plants

42. All of the following are uses of synthetic auxins, such as NAA and IBA, in agriculture and horticulture except
- A. synthetic auxins are used to promote flowering in pineapples
 - B. synthetic auxins are used to promote fruiting in pineapples
 - C. synthetic auxins induce formation of roots in plant cuttings
 - D. synthetic auxins prevent leaf and fruit abscission
 - E. synthetic auxins promote the release of fruits when mature
43. A scientist is investigating the hormone response in stems of a rose bush. She removes the apical meristem of some of the branches and allows the lateral buds to develop. What hormone will induce the development of lateral buds when the apical meristems are removed?
- A. auxin
 - B. cytokinin
 - C. gibberellin
 - D. abscisic acid
 - E. ethylene
44. A viticulturist want to grow larger grapes. A plant physiologist suggests a specific hormone treatment that would increase the internode lengths of the plants. Which hormone did the plant physiologist recommend?
- A. auxin
 - B. cytokinin
 - C. gibberellin
 - D. abscisic acid
 - E. ethylene
45. A plant physiologist treats a leaf with abscisic acid. She observes that the stomata close. She conducts another experiment to determine what happened inside the guard cells. Her investigation reveals that
- A. abscisic acid affects the closing of the stomata by influencing the movement of sodium ions out of the guard cells
 - B. abscisic acid affects the closing of the stomata by influencing the movement of potassium ions out of the guard cells
 - C. abscisic acid affects the closing of the stomata by binding carbon dioxide and causing carbonate crystals to occlude the stomatal opening
 - D. abscisic acid affects the closing of the stomata by binding with auxins and inducing water molecules to exit the guard cells
 - E. abscisic acid affects the closing of the stomata by causing the guard cells to become more turgid

46. A nondirectional, light-triggered plant development is known as
- thigmotropism
 - phototropism
 - thigmonasty
 - photomorphogenesis
 - acid-growth movement
47. Which of the following statements about phototropisms is false?
- They mostly occur through a response to green light and an estradiol receptor.
 - They include bending of plant stems toward light.
 - Occasionally roots exhibit a weak negative phototropic response.
 - They help plants gain a greater exposure to available light.
 - They can determine the development of plant organs.
48. Match each of the following.
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| _____ A. First plant hormone to be discovered. | 1. abscisic acid |
| _____ B. A chemical derivative of adenine. | 2. auxin |
| _____ C. Discovered because of a relationship to a disease of rice. | 3. cytokinin |
| _____ D. Its defoliant effects were first noticed when it leaked from gas lights; later found to be produced by plants themselves. | 4. ethylene |
| _____ E. Influential in the opening and closing of stomata. | 5. gibberellin |

Answer Key

No. on Test	Correct Answer
1	heat shock
2	pulvini
3	dormant
4	hormones
5	gibberellin (or gibberellic acid)
6	oligosaccharins
7	phototropisms
8	turgor
9	brassinosteroids
10	B
11	D
12	A
13	D
14	B
15	E
16	A
17	C
18	D
19	B
20	D
21	B
22	B
23	B
24	E
25	E
26	A
27	C
28	E
29	D
30	C
31	B
32	A
33	C
34	C

35	C
36	E
37	E
38	D
39	A
40	A
41	B
42	E
43	B
44	C
45	B
46	D
47	A
48	1-E, 2-A, 3-B, 4-D, 5-C