# AP Biology Interactive Student Study Guide

## North Salem University

**MISSION**: *Engage students to continuously learn, question, define and solve problems through critical and creative thinking.*

# Spring 2024

*Chs 48/49 describe the basic structure and function of the human nervous system. Ch.39 focuses on how plants respond to an always changing environment. At the cellular level, plants and animals are surprisingly similar in their signaling mechanisms. The video "What Plants Talk About" will highlight the many ways plants behave and interact with one another. Ch.51 emphasizes the nature of animal behavior, how biologists study it, and the function of behavior in the relationship between an animal and its environment.*

***If you have any problems – please sign up for extra help after school.***

**Chapters : 48/49/39/51**

# Nervous System

**and**

# Behavior

# Guided Reading: Chapter 48

## OBJECTIVES:

***An Overview of Nervous Systems***

___1. Describe the three major functions of the nervous system.
___2. List and describe the major parts of a neuron and explain the function of each.
___3. Define a reflex and describe the pathway of a simple reflex arc.
___4. Compare the location of the cell bodies of motor neurons, interneurons, and sensory neurons.

***The Nature of Nerve Signals***

___5. Define a membrane potential and a resting potential.
___6. Describe the factors that contribute to a membrane potential.
___7. Explain the role of the sodium-potassium pump.
___8. Describe the characteristics of an action potential.
___9. Explain the role of voltage-gated ion channels in this process.
___10. Explain how an action potential is propagated along an axon.
___11. Describe the factors that affect the speed of action potentials along an axon and describe adaptations that increase the speed of propagation.
___12. Describe the structures of a chemical synapse and describe how an action potential is transmitted from one cell to another.
___13. Describe the types and functions of the major neurotransmitters.

***The Evolution and Diversity of Nervous Systems***

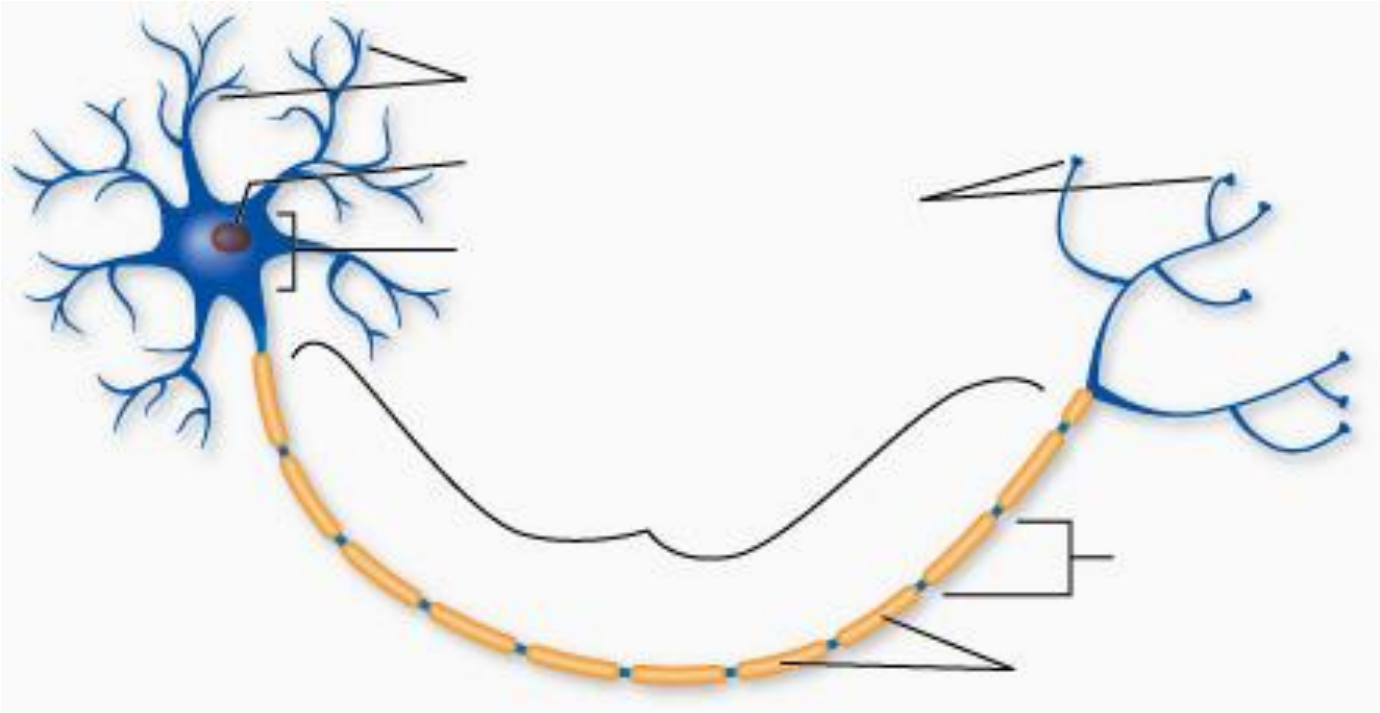
___14. Describe the structures and functions of the following brain regions:
Cerebrum - Thalmus - Hypothalmus - Cerebral Cortex - Cerebellum - Medulla oblongata - Pons

**1.** Define the following terms:

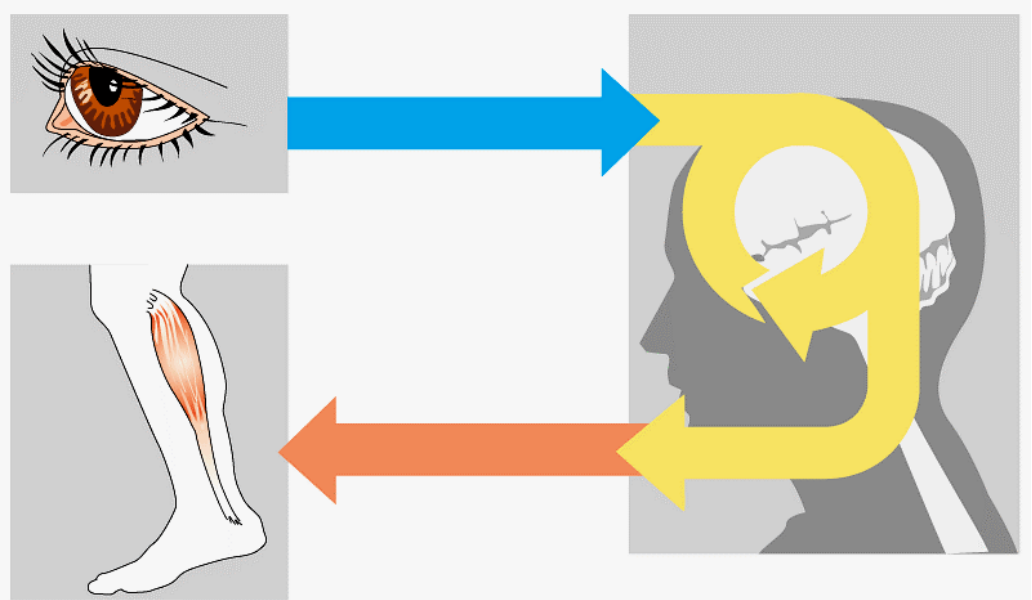
**(a) <u>Sensory Receptors</u> –**

**(b) <u>Effector Cells</u> –**

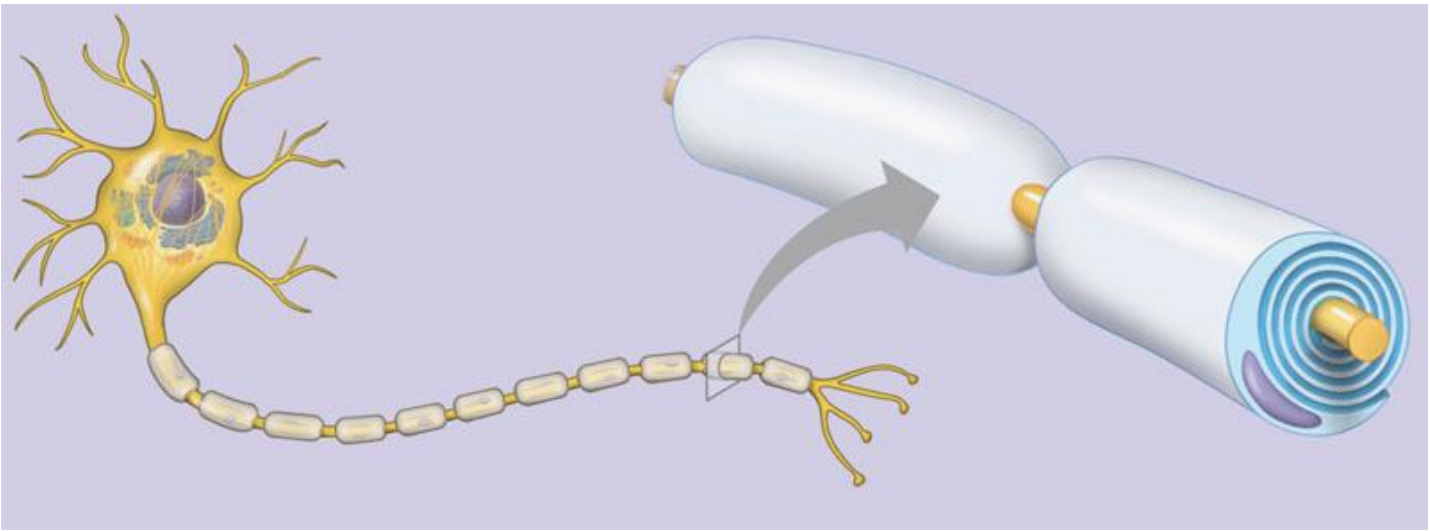
**2.** Label the diagram of the **neuron** below. *(Figure 48.2)*



**3.** Label the diagram below representing an overview of the human nervous system. *(Figure 48.1)*



**4.** Label the diagram below and use it to explain why myelin *(remember Lorenzo's Oil)* is important in nerve conduction? *(Figure 48.5)*



**5.** Define the following terms related to the conduction of an **electrochemical impulse** along a neuron:

**a. <u>Polarized</u> -**

**b. <u>Membrane potential</u> -**

**c. <u>Resting potential</u> -**

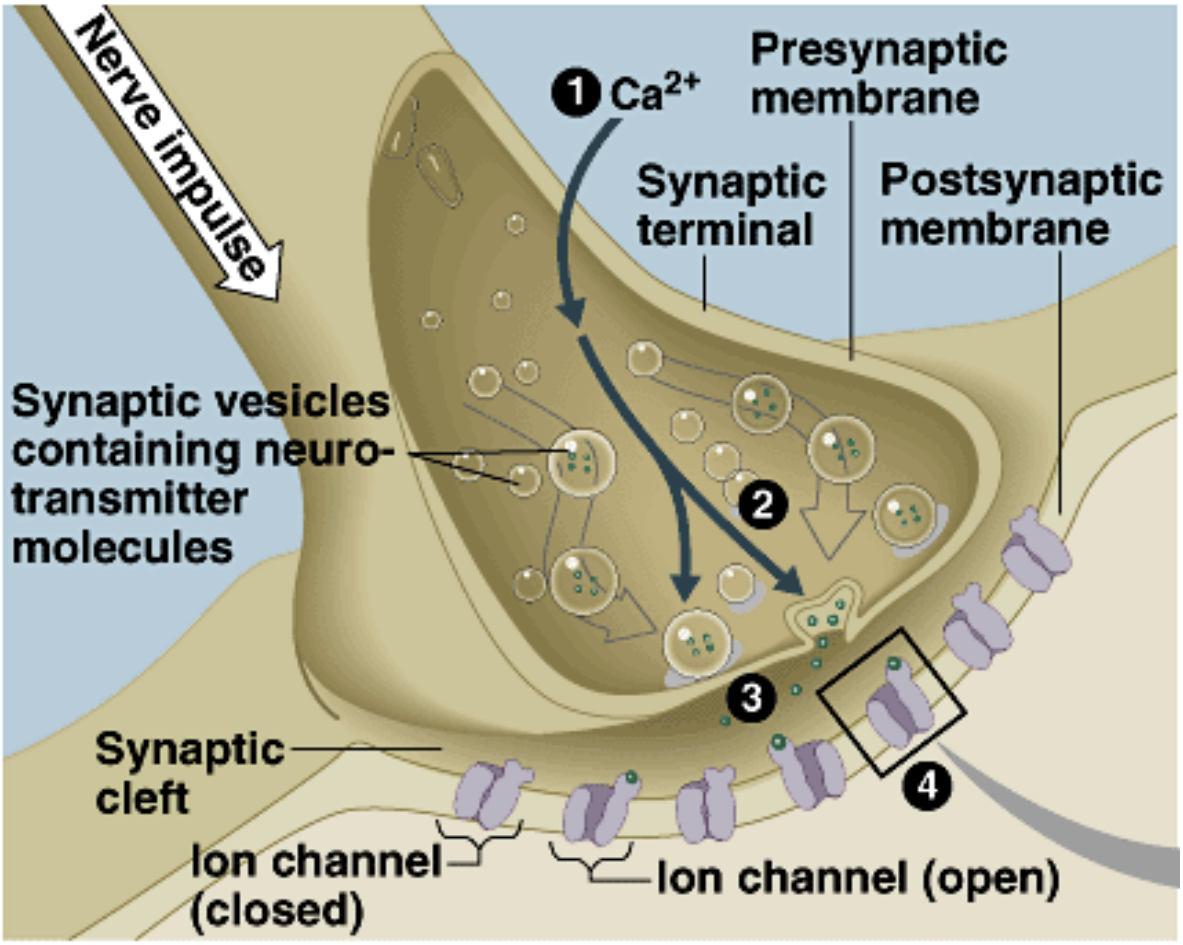
**d. <u>Depolarization</u> -**

**e. <u>Action potential</u> -**

**6.** How does the **sodium-potassium pump** maintain a membrane potential?
*Hint: What gets pumped in and out?*

**7.** How does **myelination** and **salutatory conduction** affect the speed of an action potential? (See #4)

**8.** Use the diagram below to describe the activity of a chemical **synapse**. *(Figure 48.12)*




**(1)**

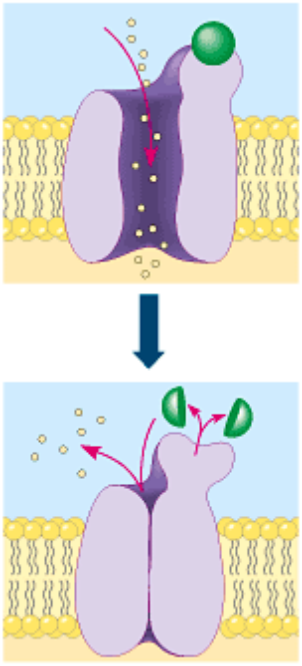
**(2)**

**(3)**

**(4)**

**9.** What are **neurotransmitters**?

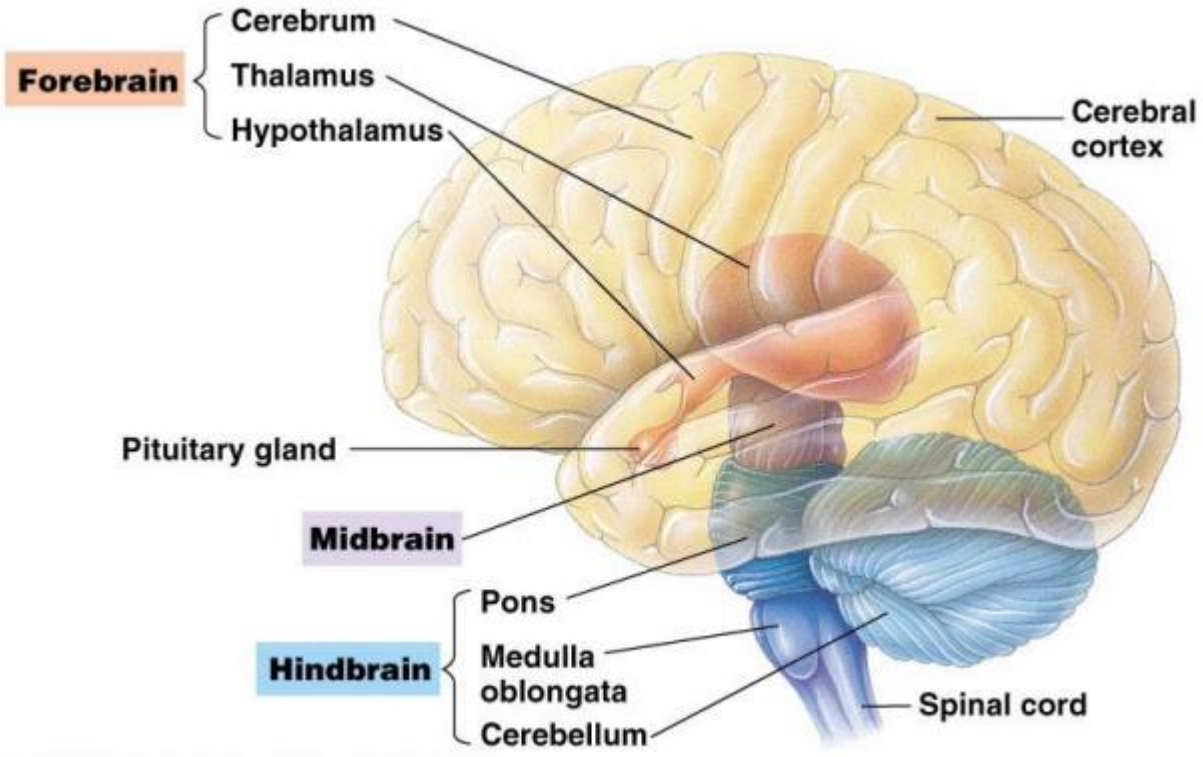
**10.** Label the diagram below and use it to describe the activity of a **neurotransmitters** at **chemical synapse**. *(Figure 48.12)*



**11.** Neurotransmitters are a special class of protein molecules that enable nerve cells to communicate with one another. One neurotransmitter can trigger a host of different responses depending on the receptors present on the postsynaptic cell. Some responses may be quick (*a few milliseconds*) others may take longer (*due to the signal transduction pathway*). In the table below, describe the major functions of each neurotransmitter.

| Neurotansmitter | Function(s) |
|---|---|
| **Acetylcholine** | |
| **Epinepherine (Adrenaline)** | |
| **Norepinepherine (Noradrenaline)** | |
| **Dopamine** | |
| **Serotonin** | |

**12.** Describe the major functions of the brain in the table located below the diagram. *(Figure 48.20)*




| Part of the Brain | Major Function(s) |
|---|---|
| **Cerebrum** | |
| **Thalmus** | |
| **Hypothalmus** | |
| **Cerebral Cortex** | |
| **Cerebellum** | |
| **Medulla oblongata** | |

# Chapter 51: Behavioral Biology

## OBJECTIVES:

**Introduction to Behavior and Behavioral Ecology**

__1. Define behavior.
__2. Distinguish between proximate and ultimate questions about behavior.
__3. Explain how genes and the environment contribute to behavior.
__4. Explain what is unique about innate behavior.
__5. Define fixed action patterns and give examples in fish and humans.
__6. Describe the evolutionary basis for behavioral ecology.
__7. Explain why it is useful to use evolutionary principles as a guide to behavioral research.

**Learning**

__8. Explain how learning, maturation, and habituation influence behavior.
__9. Define imprinting and explain the importance of the sensitive period. Illustrate these concepts using examples from bird song.
__10. Distinguish between classical conditioning and operant conditioning.
__11. Define play and describe several possible adaptive advantages of this behavior.

**Animal Cognition**

__12. Describe the ultimate bases of learning.
__13. Describe and illustrate with examples kinesis, taxis, and migration.

**Social Behavior and Sociobiology**

__14. Relate an animal's mode of communication to its lifestyle.
__15. Explain how honeybees communicate information about the location of sources of food.

## KEY TERMS:

| | | | |
|---|---|---|---|
| associative learning | behavior | behavioral ecology | classical conditioning |
| cognition courtship | fixed action pattern | foraging | habituation |
| imprinting | kin selection | kinesis | learning |
| pheromone | operant conditioning | sensitive period | sign stimulus |
| signal | social behavior | taxis | |

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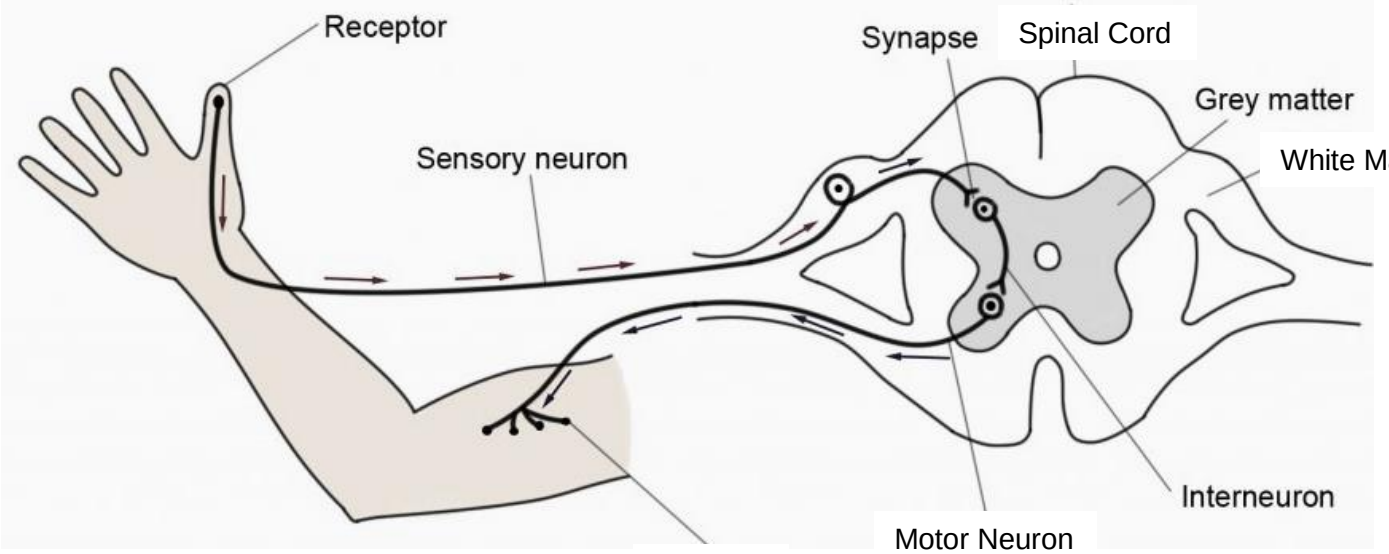
## WORD ROOTS:

**agon-** = a contest (*agonistic behavior*: a type of behavior involving a contest of some kind that determines which competitor gains access to some resource, such as food or mates)
**andro-** = a man (*polyandry*: a polygamous mating system involving one female and many males)
**etho-** = custom, habit (*ethology*: the study of animal behavior in natural conditions)
**gyno-** = a woman (*polygyny*: a polygamous mating system involving one male and many females)
**kine-** = move (*kinesis*: a change in activity rate in response to a stimulus)
**mono-** = one; **-gamy** = reproduction (*monogamous*: a type of relationship in which one male mates with just one female)
**poly-** = many (*polygamous*: a type of relationship in which an individual of one sex mates with several of the other)
**socio-** = a companion (*sociobiology*: the study of social behavior based on evolutionary theory)

# A Simple Reflex Arc




| Structure | Function |
|---|---|
| **Receptor** | |
| **Sensory Neuron** | |
| **Synapse** | |
| **Spinal Cord** | |
| **Grey Matter** | |
| **White Matter** | |
| **Interneuron** | |
| **Motor Neuron** | |
| **Effector** | |

**1.** How do behavioral ecologists define **behavior**?

**2.** What influences behavior more: genes or the environment?
*(nature)* *(nurture)*

**3.** Define and give three examples of and **innate** behaviors.

**4.** What is the relationship between a **fixed action pattern** (FAP) and a **sign stimulus**?

**5.** Briefly describe Niko Tinbergen's experiment on **innate behavior** using stickleback fish.

**6.** What is **behavioral ecology**?

**7.** What is **learning**?

**8.** How do the alarm calls of vervet monkeys provide an example of how animals improve a behavior by means of **learning**?

**9.** Define **habituation** and explain how it helps the overall fitness of an organism.

**10.** Briefly describe Konrad Lorenz's **imprinting** experiment using graylag geese being sure to use the term **sensitive period** in your answer.

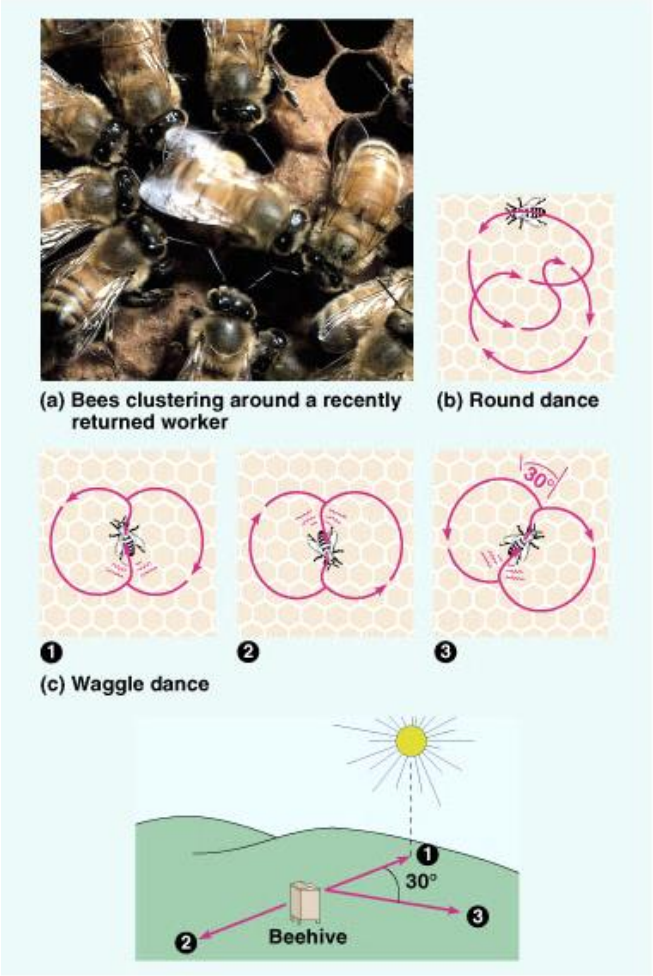
**11.** Briefly describe Ivan Pavlov's **classical conditioning experiment** using dogs.


**12.** What is the difference between **classical conditioning** and **operant conditioning**?

**13.** Compare and contrast and give specific examples of **kinesis** and **taxis.**

**14.** What are **phermones** and give three examples of pheromone use by animals.

**15.** Use the diagram below to explain how honeybees communicate information about the location of sources of food.



# Chapter 51: Summary of Key Concepts

## INTRODUCTION TO BEHAVIOR AND BEHAVIORAL ECOLOGY

- What is behavior? (p. 1122) Behavior mainly consists of observable muscle-powered movements.
- Behavior has both proximate and ultimate causes (p. 1122) Proximate mechanisms include the hormonal, nervous, and environmental stimuli that elicit a particular behavior pattern during the life of an animal. Ultimate causes are the reasons why the behavior pattern evolved over evolutionary time.
- Behavior results from both genes and environmental factors (p. 1122-1123, FIGURE 51.1) An individual's behavior develops under the influence of genes and environment.
- Innate behavior is developmentally fixed (pp. 1123-1124) An innate behavior is one that occurs in all individuals of a population, regardless of individual differences in experience.
- Classical ethology presaged an evolutionary approach to behavioral biology (pp. 1124-1126, FIGURES 51.2-51.4) Early ethologists focused on fixed action patterns (FAPs), essentially unchangeable series of acts usually carried to completion once triggered by an external sensory stimulus (sign stimulus).
- Behavioral ecology emphasizes evolutionary hypotheses (pp. 1126-1128, FIGURES 51.5-51.7) Behavioral ecology is based on the theory that animals behave in ways that increase their Darwinian fitness (reproductive success).

## LEARNING

- Learning is experience-based modification of behavior (pp. 1128-1129, FIGURE 51.8) Learning is modification of behavior resulting from specific experiences. Some apparent learning is due mostly to inherent maturation. Habituation is a simple kind of learning involving loss of sensitivity to unimportant stimuli.
- Imprinting is learning limited to a sensitive period (pp. 1129-1130, FIGURE 51.9) Imprinting occurs in various animals and can involve the identity of mating partners as well as of parents.
- Bird song provides a model system for understanding the development of behavior (pp. 1130-1132, FIGURE 51.10) Biologists have described two forms of development of bird song: learning during a sensitive period (as in the white-crowned sparrow); and open-ended learning (as in the canary), in which the bird continually adds new components to its song each year.
- Many animals can learn to associate one stimulus with another (p. 1132, FIGURE 51.11) Associative learning involves linking one stimulus with another. In operant conditioning, or trial-and-error learning, an animal learns to associate one of its own behaviors with reward or punishment and modifies the behavior accordingly.
- Practice and exercise may explain the ultimate bases of play (pp. 1132-1133, FIGURE 51.12) The benefits of play may include the practice of survival behaviors, such as hunting, as well as fulfilling the need for exercise.

## ANIMAL COGNITION

- The study of cognition connects nervous system function with behavior (pp. 1133-1134, FIGURE 51.13) Cognition is the ability of an animal's nervous system to perceive, store, process, and use information gathered by sensory receptors.
- Animals use various cognitive mechanisms during movement through space (pp. 1134-1136, FIGURES 51.14-51.16) Many animals find their way around in space by means of memorized landmarks. Some migrating birds and other animals navigate by calibrating several cues: Earth's magnetic field, the sun, and the stars.

## SOCIAL BEHAVIOR AND SOCIOBIOLOGY

- Sociobiology places social behavior in an evolutionary context (p. 1137) Social behavior encompasses the spectrum of interactions between two or more animals, usually of the same species.
- Natural selection favors mating behavior that mazimizes the quantity or quality of mating partners (pp. 1140-1142, FIGURES 51.23-51.25) Courtship functions to identify that two individuals are of the same species and are ready to breed. The full elaboration of courtship is due to sexual selection, particularly female choice. During courtship, a male may display his genetic quality and (in species with parental care) his readiness for parental care. The mating system of a species consists of the way in which males and females associate for breeding; mating systems may be promiscuous, monogamous, or polygamous, depending partly on the parental investment made by males and females.
- Social interactions depend on diverse modes of communication (pp. 1142-1144, FIGURES 51.26, 51.27) Animals communicate by means of signals, in which the behavior of one individual leads to a change in the behavior of another individual.

  *Web/CD Activity51A: Honeybee Waggle Dance Video*

# Chapter 39: Plant Responses

## OBJECTIVES:

**Signal Transduction and Plant Responses**

__1. Describe the signal transduction pathway.
__2. Describe the role of second messengers in the signal transduction process.
__3. Describe the two main mechanisms by which a signaling pathway can activate an enzyme.

**Plant Responses to Hormones**

__4. Explain how a hormone may cause its effect on plant growth and development.

**Plant Responses to Light**

__5. Define circadian rhythm and explain what happens when an organism is artificially maintained in a constant environment.
__6. List some common factors that affect biological clocks.
__7. Define photoperiodism.
__8. Explain how flowering might be controlled and what is necessary for flowering to occur.

**Plant Responses to Environmental Stimuli Other than Light**

__9. Describe how plants apparently tell up from down.
__10. Explain why roots display positive gravitropism and shoots exhibit negative gravitropism.
__11. Distinguish between thigmotropism and thigmomorphogenesis.

**Plant Defense: Responses to Herbivores and Pathogens**

__12. Explain how plants deter herbivores with physical and chemical defenses.

## KEY TERMS:

| | | | |
|---|---|---|---|
| auxins | circadian rhythm | cytokinins | ethylene |
| gibberellins | hormone | photoperiodism | phototropism |
| secondary messenger | thigmotropism | tropism | |

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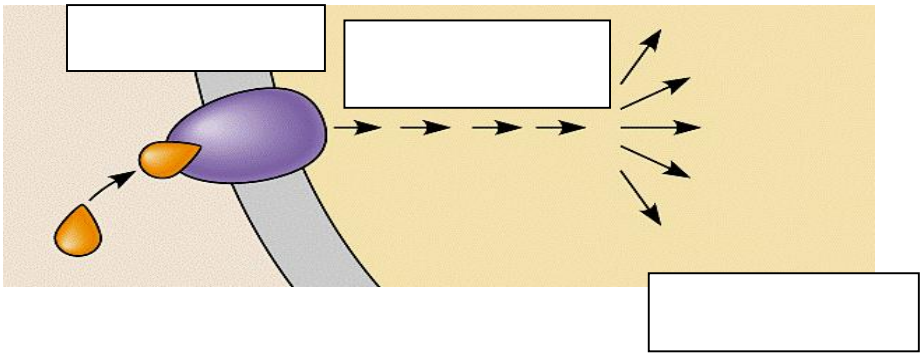
## WORD ROOTS:

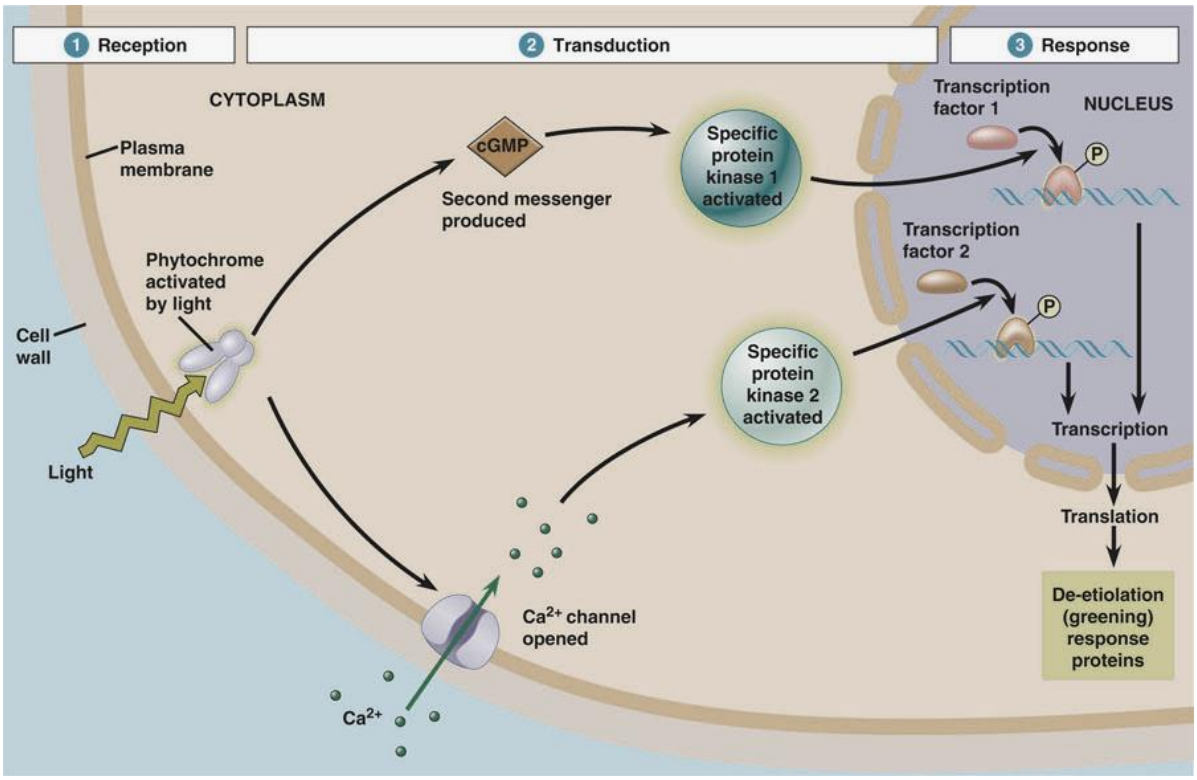
**aux-** = grow, enlarge (*auxins*: a class of plant hormones, including indoleacetic acid, having a variety of effects, such as phototropic response through the stimulation of cell elongation, stimulation of secondary growth, and the development of leaf traces and fruit)
**circ-** = a circle (*circadian rhythm*: a physiological cycle of about 24 hours, present in all eukaryotic organisms, that persists even in the absence of external cues)
**photo-** = light; **-trop** = turn, change (*phototropism*: growth of a plant shoot toward or away from light)
**phyto-** = a plant; **-alexi** to ward off (*phytoalexin*: an antibiotic, produced by plants, that destroys microorganisms or inhibits their growth)
**thigmo-** = a touch; **morpho-** = form; **-genesis** = origin (*thigmomorphogenesis*: a response in plants to chronic mechanical stimulation, resulting from increased ethylene production; an example is thickening stems in response to strong winds)
**zea-** = a grain; **-xantho** = yellow (*zeaxanthin*: a blue light photoreceptor involved in stomatal opening.

# Guided Reading: Chapter 39

**1.** Label the diagram below to review (for the 4th time this year) the general model for a signal transduction pathway.



**2.** Use the diagram below to help you describe how the signal transduction pathway and phytochromes play a role in the greening response of plants.



**3.** What role do second messengers play in the transduction process?

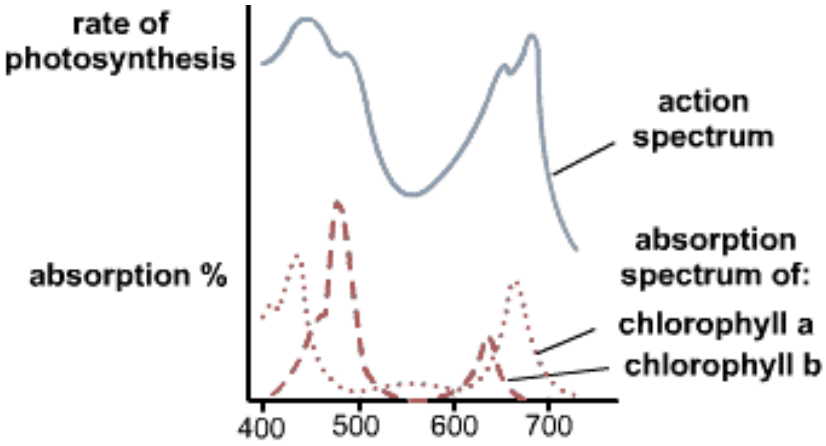
**4.** Define tropism.

**5.** What are auxins?

**6.** Fill in the chart below by describing the major functions of plant hormones.

| Hormone | Function(s) |
|---|---|
| **Auxin** | |
| **Cytokinins** | |
| **Gibberllins** | |
| **Abscisic Acid** | |
| **Ethylene** | |

**7.** Use the graph to the right to help you explain what an action spectrum is.
*(To be discussed in more detail in our next unit.)*



**8.** Define **circadian rhythm** and explain what happens when an organism is artificially maintained in a constant environment.

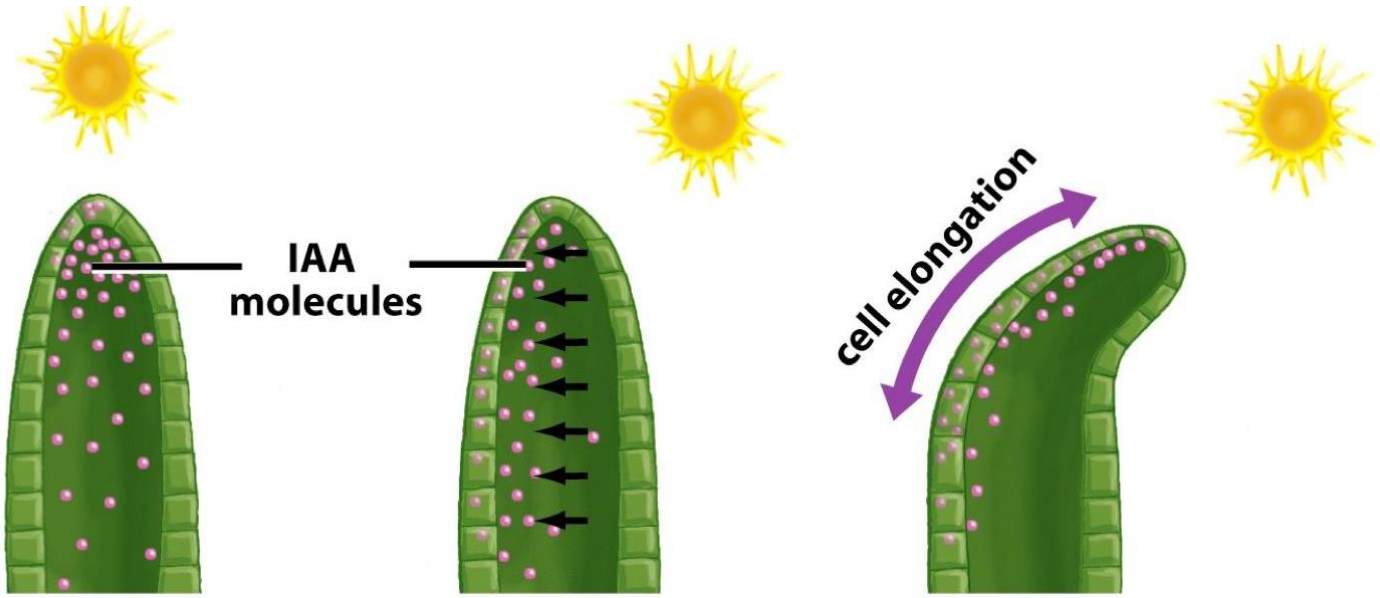
**9.** List some common factors that affect **biological clocks**.

**10.** Define and give an example of **photoperiodism**.

**11.** Explain how flowering might be controlled and what is necessary for flowering to occur.

**12.** Describe how plants apparently tell up from down.

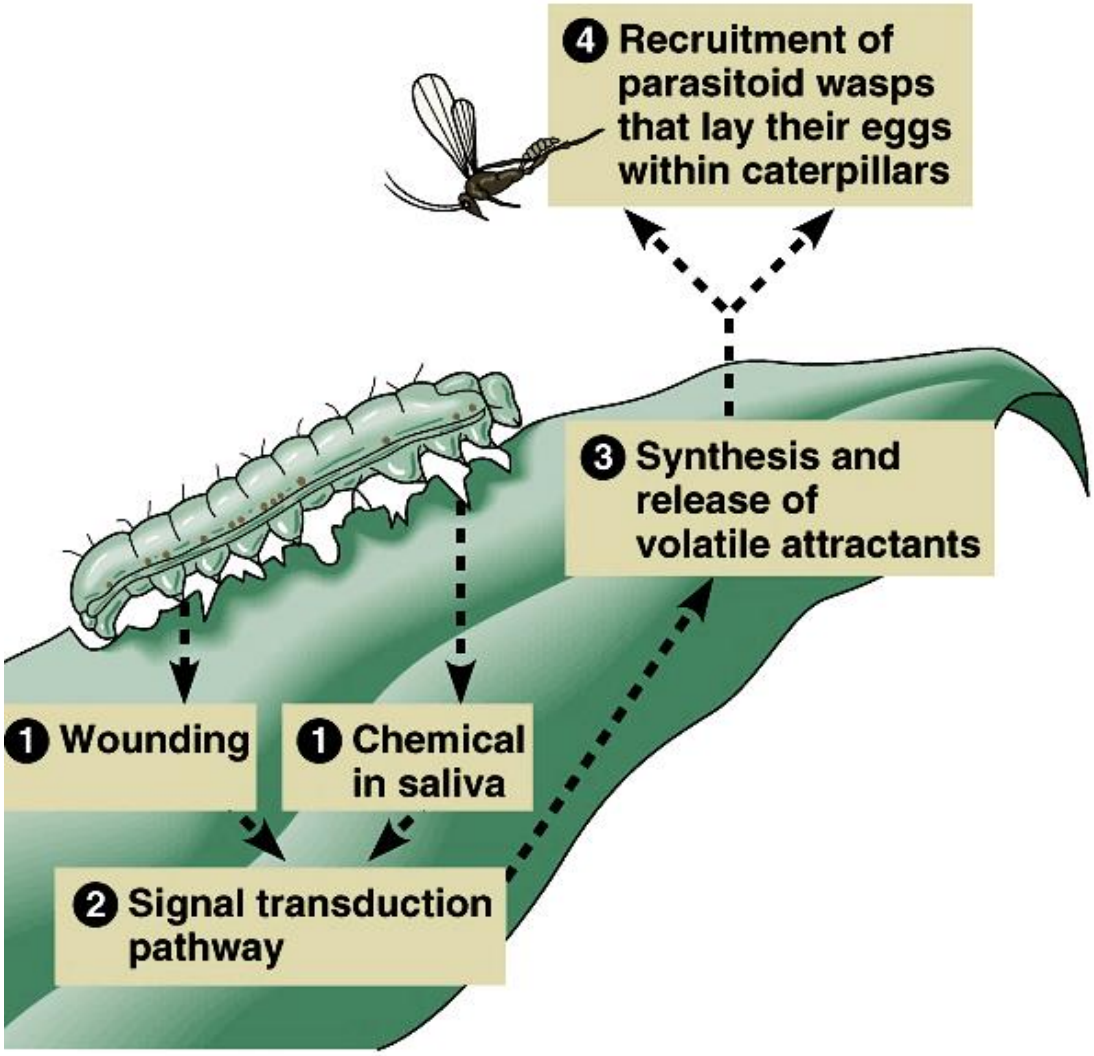
**13.** Use the diagram below to help you explain how plants respond to light.




**14.** Explain why roots display *positive* **gravitropism** and shoots exhibit *negative* **gravitropisms**.

**15.** Distinguish between **thigmotropism** and **thigmomorphogenesis**.

**16.** Use to diagram below to help explain how a corn leaf deters herbivores with physical and chemical defenses.



# Chapter 39: Summary of Key Concepts

**SIGNAL TRANSDUCTION AND PLANT RESPONSES**

- Signal-transduction pathways link internal and environmental signals to cellular responses (pp. 803-806, FIGURES 39.1-39.3) Hormones and environmental stimuli interact with specific receptors, thereby activating specific signal transduction pathways and inducing cellular responses.

**PLANT RESPONSES TO HORMONES**

- Research on how plants grow toward light led to the discovery of plant hormones (pp. 806-807, FIGURES 39.4, 39.5) Researchers discovered auxin by identifying the compound responsible for transmitting a signal downward through coleoptiles, from the tips to-the elongating regions during phototropism.
- Plant hormones help coordinate growth, development, and responses to environmental stimuli (pp. 808-817, TABLE 39.1, FIGURES 39.6-39.16) This review cites one major function of each hormone. Produced primarily in the apical meristem of the shoot, auxin simulates cell elongation in different target tissues. Cytokinins, produced in actively growing tissues such as roots, embryos, and fruits, stimulate cell division. Gibberellins produced in roots and young leaves stimulate growth in leaves and stems. Abscisic acid maintains dormancy in seeds. Ethylene helps control fruit ripening.
  *Activity39A: Leaf Abscission*

**PLANT RESPONSES TO LIGHT**

- Blue-light photoreceptors are a heterogeneous group of pigments (pp. 817-818, FIGURE 39.17) Various blue-light photoreceptors control hypocotyl elongation, stomatal opening, and phototropism.
- Phytochromes function as photoreceptors in many plant responses to light (pp. 818-819, FIGURES 39.18-39.20) Phytochromes exist in two photoreversible states, with conversion of $P_r$ to $P_{fr}$ triggering many developmental responses.
- Biological clocks control circadian rhythms in plants and other eukaryotes (pp. 819-820, FIGURE 39.21) Free-running circadian cycles are approximately 24 hours long but are entrained to exactly 24 hours by the day/night cycle.
- Light entrains the biological clock (pp. 820-821) Phytochrome conversion marks sunrise and sunset, providing the clock with environmental cues.
- Photoperiodism synchronizes many plant responses to changes of season (pp. 821-823, FIGURES 39.22-39.24) Some developmental processes, including flowering in many plant species, require a certain photoperiod. For example, a critical night length sets a minimum (in short-day plants) or maximum (in long-day plants) number of hours of darkness required for flowering.
  *Activity39B: Flowering Lab*

**PLANT RESPONSES TO ENVIRONMENTAL STIMULI OTHER THAN LIGHT**

- Plants respond to environmental stimuli through a combination of developmental and physiological mechanisms (pp. 823-827, FIGURES 39.25-39.28) In addition to light, other important environmental stimuli and stresses include gravity, mechanical stimulation, water deficit, salinity, flooding, oxygen deprivation, heat, and cold.

**PLANT DEFENSE: RESPONSES TO HERBIVORES AND PATHOGENS**

- Plants deter herbivores with both physical and chemical defenses (pp. 827-828, FIGURE 39.29) Physical defenses include morphological adaptations such as thorns, chemical defenses such as distasteful or toxic compounds, and airborne attractants that bring animals that destroy herbivores.

# How Plants Tell Time

**Directions**: Go to Collea's Corner to watch the above mentioned Ted-Ed video and then answers the questions below.

**Background Information:**

Morning glories unfurl their petals like clockwork in the early morning. A closing white waterlily signals that it's late afternoon. And moon flowers, as their name suggests, only bloom under the night sky. What gives plants this innate sense of time? Dasha Savage investigates how circadian rhythms act as an internal timekeeper for flora and fauna alike.

**1.** Briefly describe Carolus Linnaeus' flower clock?

**2.** Give 3 examples of how flowers can sense time.

- 
- 
- 

**3.** What are circadian rhythms and what do they allow organisms to do?

**4.** For plants, _____ and _____ are cues which trigger reactions that play out at a molecular scale.

**5.** **(a)** What are phytochromes?

**(b)** What do they initiate?

**(c)** What do they sense?

**(d)** What do they detect?

**6.** What two things do phytochromes allow a plant to discern?

- 
- 

**7.** What is starch?

**8.** Circadian rhythms are especially important in the beginning of a plant's life. Until their phytochromes perceive the presence of light, seed sprouts grow tall and long, and do not produce any chlorophyll. As soon as they reach light, they begin to produce chlorophyll and broader leaves.
What are the advantages of producing chlorophyll only after the presence of light?

# Nature: *What Plants Talk About*

When we think about plants, we don't often associate a term like "behavior" with them, but experimental plant ecologist JC Cahill wants to change that. The University of Alberta professor maintains that plants do behave and lead anything but solitary and sedentary lives. ***What Plants Talk About*** teaches us all that plants are smarter and much more interactive than we thought!

## Video Questions

**1.** Out in the field, observing pant behavior is like _____,

Unless of course, you _____. ***(3:00)***

**2.** One of the ways plants behave is through _____. ***(3:15)***

| TROPISMS | | |
|---|---|---|
| **Stimulus** | **Direction** | **Response** |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

**3.** Which nutrient (*organic compound*) do you think the bug provides for the Venus Fly Trap? ***(4:19)***

_____

**4.** As much as _____% of a plants total mass lives below the ground. ***(5:46)***

**5.** What purpose do root hairs serve for the root? _____

**6.** The major function of roots is to _____

**7.** How do plants find the food they are foraging for both above and below the ground when they have no eyes, no ears and no brain? ***(8:30)***

_____

_____

**8.** Briefly describe the experiment designed to see if the Daughter Vine can actually choose between 2 different host plants. ***(11:00)***

*Independent Variable*:_____

*Dependent Variable*: _____

*Controlled Variables*: _____

_____

What can be done to make this experiment better…more valid ***(11:50)***

_____

_____

**9.** What are green leaf volatiles? _____

**10.** What did the 2nd Daughter Vine experiment reveal about how this plant detects its host? ***(12:45)***

_____

_____

**11.** How does the tomato plant respond to being attacked by a daughter vine? ***(13:30)***

_____

_____

**12**. List 2 ways in which the Wild Tobacco Plant responds to threats in its environment. ***(16:31)***

| **Wild Tobacco Plant Defense Mechanisms** | |
|---|---|
| Threat | Response |
| | |
| | |

**13.** How does the Wild Tobacco Plant know who is attacking it? ***(20:40)***

_____

**14.** What is a tricone and how do Tobacco Plants use them to protect themselves? ***(22:00)***

_____

_____

**15.** Who is the Wild Tobaccos Plant best friend? ***(22:30)*** _____

**16.** When does the Wild Tobacco Plant bloom and why is this a good thing? ***(23:00)***

_____

_____

**17.** How does the Wild Tobacco Plant prevent itself from being pollenated by the Hawk Moth? ***(24:18)***

_____

_____

**18.** In the table below, list the biochemical, physiological and behavioral changes that take place in the Wild Tobacco Plant that allow it to communicate with and be pollenated by the Humming Bird. ***(25:00)***

| **Changes in the Wild Tobacco Plant to Attract Humming Birds** | |
|---|---|
| ***Biochemical*** | |
| ***Physiological*** | |
| ***Behavioral*** | |

**19.** Why is being fertilized by a Humming Bird better for the Wild Tobacco Plant? ***(25:45)***

_____

**20.** Why is continuously yelling for pollinators an evolutionary advantage (*adaptation*) for the Wild Tobacco Plant? ***(27:00)***

_____

**21.** Spotted Knap Weed is an _____ species from _____. ***(28:20)***

**22.** What ***biological control*** has the rancher utilized to combat the spread of Spotted Knap Weed? ***(29:55)***

_____

**23.** How does the Spotted Knap Weed capture and hold huge pieces of territory? ***(32:49)***

_____

_____

**24.** Spotted Knap Weed is waging _____ warfare with its neighbors. ***(34:15)***

**25.** _____ plants are immune to the chemical warfare of the Spotted Knap Weed and, in fact, release their own chemical called _____ that not only protects itself, but also protects the plants around it from the Spotted Knap Weed. ***(35:00)***

**26.** What is the dominant form of social interacting between plants?

_____

**27.** What 2 things do animals use **Kin-Recognition** for? ***(37:30)***

**a)** _____

**b)** _____

**28.** Why is mating with a relative a bad thing (*genetically speaking*)?

_____

_____

**29.** What is **altruistic behavior** (***altruism***)?

_____

**30.** How did the Sea Rocket siblings exhibit altruistic behavior? ***(40:00)***

_____

_____

**31.** Altruism can be defined as - _____

_____ ***(40:23)***

**32.** Douglas Fir trees can live up to _____ years. (***43:30)***

**33.** The _____ of fungi are filled with tiny _____ used in reproduction. (***43:50)***

**34.** The tree provides the fungi with _____ and the fungi provide the trees with _____ ***(47:17).*** This is symbiotic relationship is an example of _____.

**35.** Why was C14 used in the tree communication experiment?

_____

_____

**36.** What did the C14 experiment reveal about who benefits the most from this carbon (*food*) sharing network? ***(50:00)***

_____

**37.** List 4 different examples (from the film) of how different species in an ecosystem interact with one another.

(**1)**

**(2)**

**(3)**

**(4)**

**38.** List 2 behaviors that some plants exhibit, which are what we perceive as very animal like behaviors.

(**1)**

**(2)**

# Animal / Plant Behavior Review Questions

___ 1) In sensory neurons, stimuli are received by the
A) axons B) dendrites C) cell body D) myelin

___ 2) What is primarily responsible for establishing the uneven Na+ ion concentrations inside and outside a neuron during its resting potential?
A) active transport B) simple diffusion C) facilitated diffusion D) osmosis

___ 3) During the resting potential of a neuron, which of the following is least likely to be found in large quantities inside the neuron?
A) Na+
B) K+
C) negatively charged anions
D) none of the above would be found in large quantities inside the neuron

___ 4) During saltatory conduction, a nerve impulse jumps from one _____ to another.
A) myelin sheath B) synapse C) node of Ranvier D) dendrite

___ 5) Nerve impulses are normally carried toward a neuron cell body by the neuron's -
A) synaptic cleft B) axon C) myelin sheaths D) dendrites

___ 6) The junction between a neuron and its target cell is called a -
A) neurotransmitter B) synapse C) node of Ranvier D) threshold

___ 7) Neurotransmitters are released from vesicles at the -
A) cell body
B) postsynaptic membrane
C) dendrite.
D) presynaptic membrane.

___ 8) The myelin sheath is formed by _____, which wrap around the axons of some neurons.
A) nodes of Ranvier
B) Schwann cells
C) dendrites
D) cell bodies

___ 9) In a polarized neuron at rest -
A) the inside of the neuron is more negatively charged than the outside.
B) outside of the neuron is more negatively charged than the inside.
C) either of the above can be true.
D) the inside and the outside of the neuron have the same electrical charge

___ 10) The role of the Na+/K+ pump in the nervous system is to -
A) maintain proper ionic concentration gradients across the neuron membrane
B) generate the nerve impulse when the neuron is stimulated
C) provide a source of Na+ and K+ by splitting NaCl and other appropriate molecules
D) none of the above - it plays no role

___ 11) The thalamus is a primary site of -
A) motor reflex coordination.
B) hormone production.
C) sensory integration.
D) coordination and balance.

___ 12) A nerve impulse is received first by what part of the neuron?
A) Axon B) Synapse C) Dendrite D) Cell Body

___ 13) What occurs sequentially when the nerve impulse is transmitted from the synapse of one neuron to the postsynaptic neuron?
A) The nerve impulse is transmitted next to the axon of the presynaptic neuron.
B) The synaptic vesicles release neurotransmitters into the synaptic cleft by exocytosis.
C) The nerve impulse is transmitted to the postsynaptic neuron by a direct connection between the two.
D) The nerve impulse is transmitted to the axon of the postsynaptic neuron.

___ 14) Which statement best defines saltatory conduction?
A) Saltatory conduction is a mechanism of endocrine system regulation.
B) Saltatory conduction is signal transduction of incoming messages through the membrane.
C) Saltatory conduction is the influx of sodium ions during neuron impulse conduction.
D) Saltatory conduction is transmission of nerve impulses along myelinated fibers.

___ 15) Which of the following is true for nerve impulses?
A) They are electrochemical in nature.
B) They are transmitted rapidly.
C) They are self-propagating.
D) All of these are true.

___ 16) When a nipple is placed in a newborn baby's mouth, the infant will begin to suckle. This is an example of -
A) imprinted behavior.
B) innate behavior.
C) classical conditioning.
D) imitation.

___ 17) Many rats were tested for their ability to learn a maze. The average number of errors for a total of 14 trials was 64 per rat. The rats that made the fewest errors were bred to each other, and the offspring were tested in a similar way. This process was repeated for seven generations, at which point the average number of errors for 14 trials was 36. This experiment demonstrates that -
A) learned behavior cannot be inherited.
B) maze-learning ability has a genetic basis.
C) maze-learning ability depends mainly on early contact with adept parents.
D) natural selection has a role in the evolution of fixed action patterns but not in the evolution of behavior involving learning.

___ 18) The modification of behavior based upon specific experiences defines -
A) habituation.
B) conditioning.
C) imprinting.
D) learning.

___ 19) When you successfully study with the TV on in the background, you are demonstrating -
A) habituation.
B) associative learning.
C) imprinting.
D) conditioning.

___ 20) A grayling butterfly will normally fly toward the sun. This is an example of -
A) kinesis.
B) phototropism.
C) migration.
D) taxis.

___ 21) Based on von Frisch's work on honeybee communication, which of the following types of information will be communicated to other workers by a honeybee's "dance"?
A) the direction of the nectar source
B) the distance of the nectar source from the nearest water
C) the color of the flowers producing the nectar
D) the quality of the nectar

___22) Plants grow toward light through the action of -
A) hormones.
B) solar energy.
C) auxins.
D) chloroplasts.

___ 23) Grass shoots bend toward the light because, on the shadowed side, a(n) -
A) reduction in auxin levels promotes cell elongation.
B) increase in auxin levels promotes cell elongation.
C) reduction in auxin levels prevents cell elongation.
D) increase in auxin levels promotes cell division.

___ 24) One of the experiments in phototropism involved cutting off the tips of grass seedlings before exposing them to light from one side. The decapitated seedlings did not bend toward light. A valid conclusion from this experiment would be that -
A) plants cannot engage in photosynthesis without the tip of the plant.
B) light is perceived by the tip of grass plants.
C) a foil cover over the tip of the seedlings would cause them to bend.
D) hormones are produced in all parts of the plant.

___ 25) Plant hormones -
A) must be produced in large quantities to be effective.
B) act on all cells they encounter.
C) are chemical signals that influence growth and development.
D) are rare and produced only in response to stress.

___ 26) What is one main effect of auxins on plant growth?
A) They reduce growth by inhibiting cell division.
B) They increase growth by promoting cell elongation.
C) They increase growth by increasing the rate of photosynthesis.
D) Auxins have no effect on plant growth.

___ 27) Which of the following growth responses causes the shoots of a plant grown in the dark to grow upward?
A) phototropism
B) photoperiodism
C) thigmotropism
D) gravitropism

___ 28) The plant growth response to touch is known as -
A) gravitropism.
B) bolting.
C) geotropism.
D) thigmotropism.

___ 29) What term refers to seasonal changes in the relative lengths of night and day?
A) photoperiod
B) gravitropism
C) circadian rhythm
D) phototaxis

___ 30) Which of the following is a way that plants use animals as a defense against herbivores?
A) production of an amino acid that harms herbivores
B) attraction of wasps that kill herbivorous caterpillars
C) release of microbe-killing chemicals in response to infection
D) coevolution between plants and predators