

# AP Biology



- *Behavioral Biology*

# Day 1 Objectives

- Describe how organisms get innate behaviors
- Explain how learning occurs
- Explain how living organisms regulate behavior
- Analyze how environmental factors can affect behavior
- Describe how organisms learn

## QOD #1 (Question of the Day)



- Design a simple experiment to tell whether egg-rolling in geese is an innate or learned behavior.

# Elephants in the Lobby



- **Elephants march through hotel lobby after it was built on their migration trail! The Mfuwe Lodge in Zambia happens to have been built next to a mango grove that one family of elephants has always visited when the fruit ripens. When they returned one year and found the luxury accommodation in the way, they simply walked through the lobby to reach their beloved grove of trees.**



# Causes

- **proximate (near)**  
physiological genetic mechanisms  
of behavior
- **Ultimate (distant)**  
evolutionary significance of  
behavior



# Stimulus – proximate cause

- **Sign stimulus** external sensory stimulus
- **Fixed action pattern (FAP)** sequence of acts; unchangeable; carried to completion



*Supernormal stimulus*

# Behavior



- An action carried out by muscles, under control of the nervous system, in response to a stimulus

# Learning?

- Maturation - behavior due to developing physiological changes
- Habituation - loss of responsiveness to stimuli that convey no adaptive value





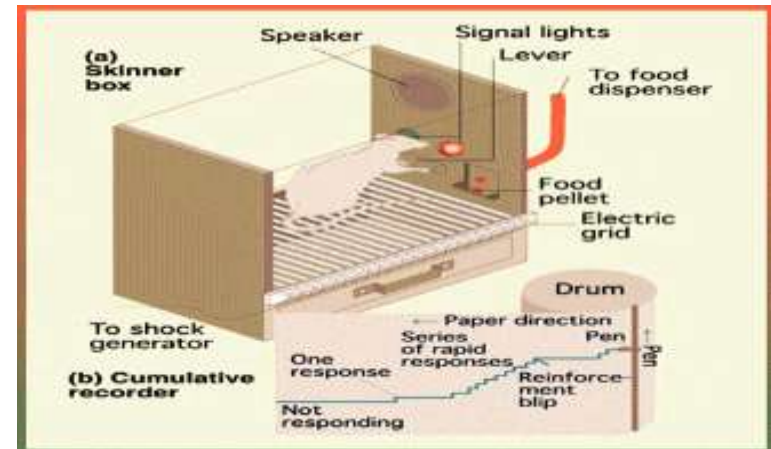
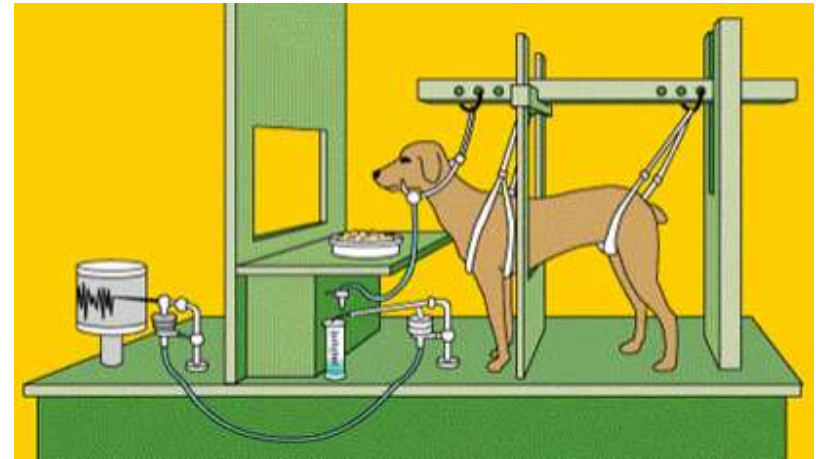
- Imprinting - learning limited within a specific time period

critical period (Lorenz, '73 Nobel)



# Conditioning

- Associative learning:
  - classical conditioning - Pavlov's dogs
- operant conditioning (trial and error)- "Skinner's box"



- <http://www.youtube.com/watch?v=Mt4N9GSBoMI>



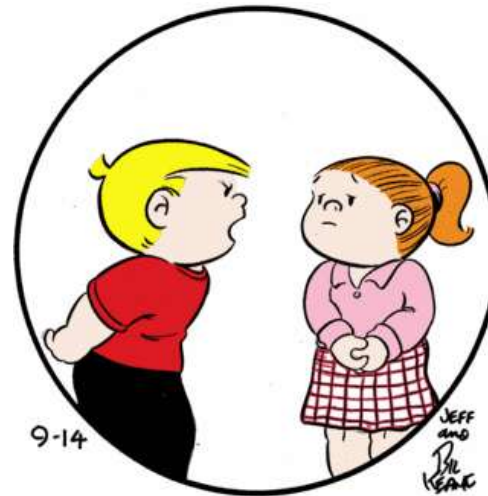
## Positive Feedback



Reward leads  
to more of the  
same good  
behavior

# Negative Feedback

- Remove a negative stimulus



9-14

"Stop being so fat, Dolly."

# Ted Talk on Operant Conditioning

- <http://ed.ted.com/lessons/the-difference-between-classical-and-operant-conditioning-peggy-andover>



# Think some more about the Elephants

- What unusual behavior do they exhibit?
- What is the cause, both ultimate and proximate?
- How do you think this behavior was learned?
- How could you find out for sure?



# Day 2 Objectives

- How do animals regulate temperature?
- How do animals use taxis and kinesis?



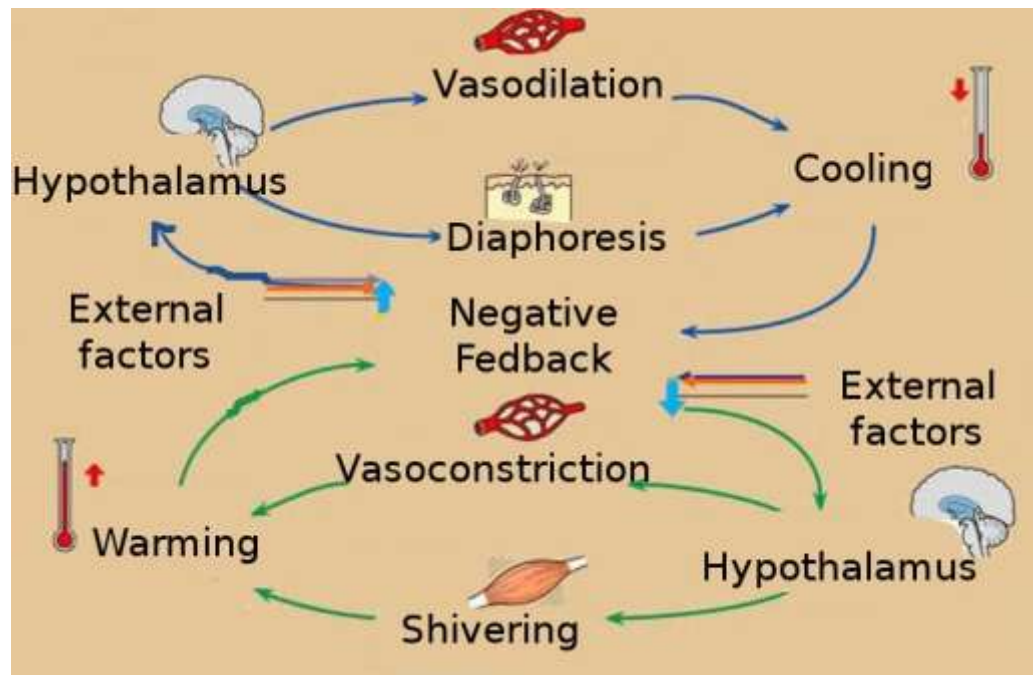
# Animal Behavior Day 2

- QOD #2
- Think about the ways that animals can control body temperature. Many are physiological. Please list at least three that are behavioral



# Temperature Regulation in Animals

- Most biological systems are complex and rely on the combination of positive and negative feedback to maintain homeostasis



# Taxis and Kinesis

- Taxis – directed movement toward or away from a stimulus
- Kinesis – random movement (think about kinetic energy)

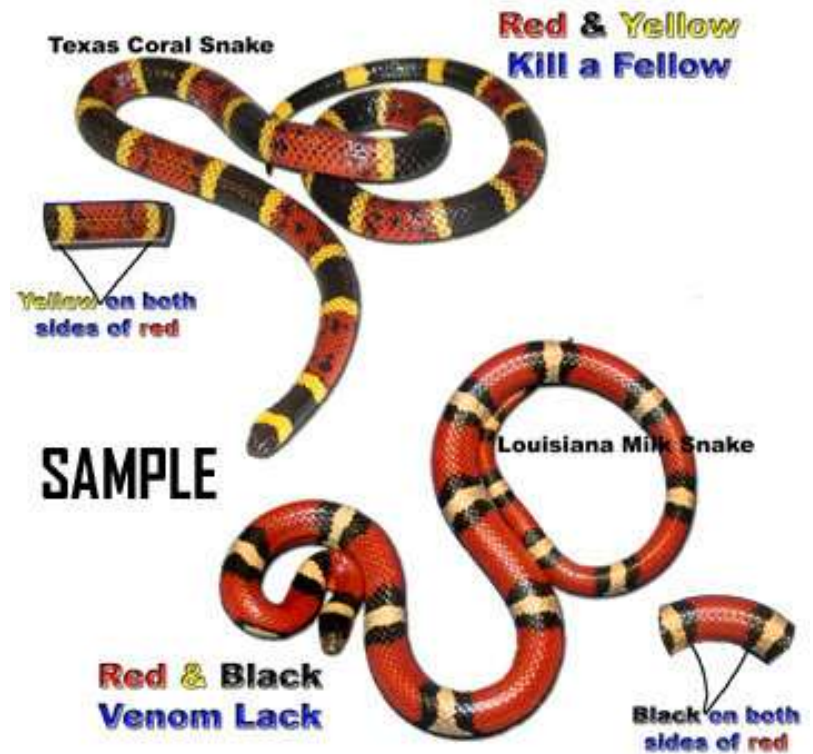


# Day 3 Objectives

- How do animals use migration and hibernation to adapt to seasonal changes?
- How do plants use coloration as a signal behavior?
- Analyze data, describe and explain how organisms exchange information in response to internal changes and external cues

# QOD

- Coral and King snakes both look very much alike. How do you think this happened, and what advantage/disadvantage does it offer



# Migration

- Movement of monarchs from Canada to Mexico may take 3-4 generations



# Altruistic behavior

- **Inclusive fitness**~ total effect an individual has on proliferating its genes by its own offspring and aid to close relatives
- **Coefficient of relatedness**~ proportion of genes that are identical because of common ancestors
- **Kin selection**~ aiding related individuals altruistically
- **Reciprocal altruism**~ exchange of aid; humans?



# Social behavior

- **Agonistic behavior**- contest behavior determining access to resources
- **Dominance hierarchy**- linear “pecking order”
- **Territoriality** - an area an individual defends excluding others
- **Mating systems:**
  - • **promiscuous**~ no strong pair bonds
  - • **monogamous**~ one male/one female
  - • **polygamous**~ one with many
  - • **polygyny**~ one male/many females
  - • **polyandry**~ one female/many males





# Mimicry

- Batesian – a nonharmful species resembles a dangerous one, so that predators avoid both
- Müllerian – two species, both dangerous mimic each other



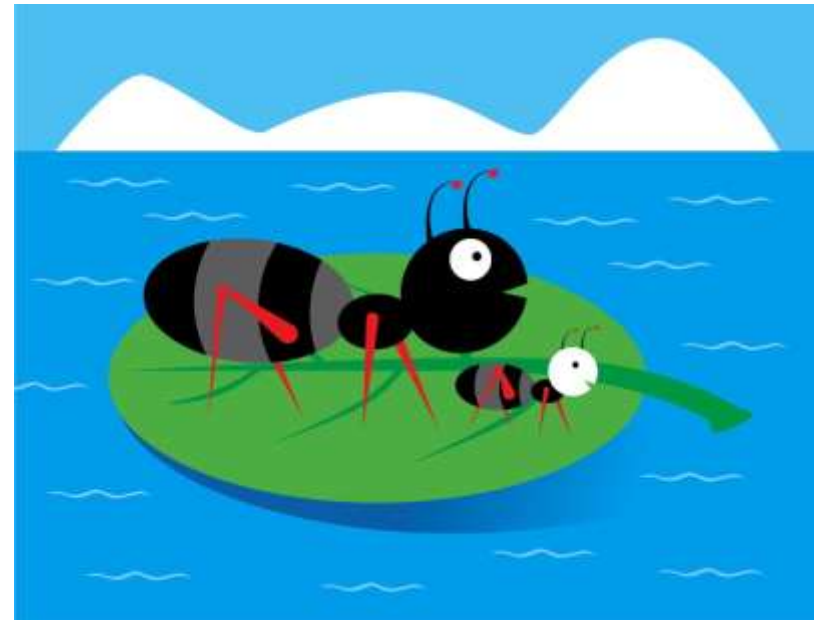
# Coevolution

- Viceroy and monarch
- Monarch and milkweed
- Salicylic acid



# How ants count

- <https://www.youtube.com/watch?v=7DDF8WZFnoU>
- As you watch the video, think about how the researchers used the scientific method



# Day 5 Objectives

- Describe the data that could be collected to learn more about how animals respond to their environments
- Explain how animals use taxis and kinesis to respond to changes in their environment
- Describe how an organisms response to information affects natural selection

# Day 5

- QOD – How do sensory organs relay sensations to the central nervous system?