Behavioral, Structural, and Reproductive Adaptations

2.1.2

- Analyze how various organisms accomplish the following life functions through adaptations with particular environments and that these adaptations have evolved to ensure survival and reproductive success.
  - Transport and excretion
  - Respiration
  - Nutrition
  - Reproduction, Growth, and Development

Transport and Excretion

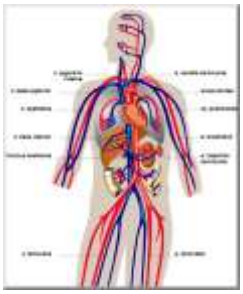
- Animals
  - Food absorbed from the digestive system enters the circulatory system where nutrients are delivered to cells throughout the body.

Digestive System

- Enzymes break down food into smaller components.
  - Mouth = amylase (carbohydrates)
  - Esophagus
  - Stomach = proteases (proteins)
  - Small Intestines (carbohydrates, proteins, lipids, and nucleic acids)
  - Large Intestines (absorbs water)
  - Anus

Liver

- Removes excess glucose and stores it as glycogen.
- Converts amino acids and fats into energy to be used during metabolism.
- Stores vitamins and minerals.
- Produces bile for fat digestion.

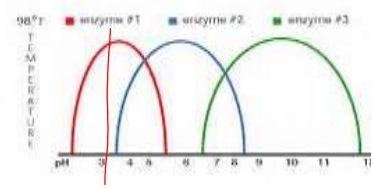


Homeostasis

- Drinking to much during meals or not eating a well balanced diet can alter the pH acidity of the stomach, making digestion harder.
- Not drinking enough water throughout the day can also decrease digestion because without water nutrients and waste cannot flow in and out of cells.

pH Levels of Organs and Body Fluids Organ or fluid pH level

- Saliva 6.5 to 7 (slightly acidic to neutral)
- Blood 7.36 (slightly basic)
- Stomach 1.5 to 3 (very acidic)
- Pancreatic juice 8.8 (basic)
- Bile 7 to 7.7 (slightly basic)
- Small intestine 7 to 7.5 (slightly basic)
- Large intestine 6.5 to 7.3 (slightly acidic to slightly basic)
- Urine 6.5 to 7 (slightly acidic to neutral)



What enzyme (protein) would work best on stomach acid with a pH of 1.5-3?

A. Enzyme 1
B. Enzyme 2
C. Enzyme 3

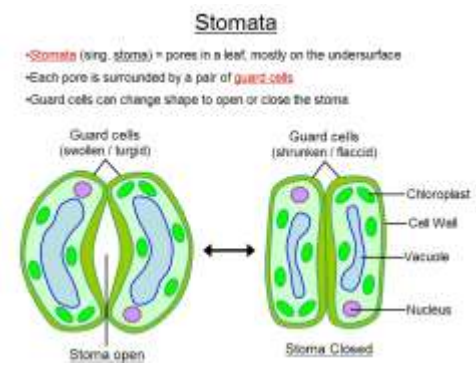
Transport and Excretion

- **Plants**
  - Vascular- **Water** travels through tissues called **xylem**
  - **Sugar Food** (glucose) travels through tissues called **phloem**.
  - Nonvascular- water and minerals enters directly through the plasma membrane and travels through the plant via osmosis.

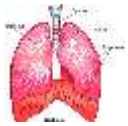
Respiration

- Release of gases
- **Plants: Stomata**
- Cellular Respiration
  - Aerobic- requires oxygen (animals, plants)
  - Anaerobic- no oxygen required (yeast, bacteria)

PLANTS



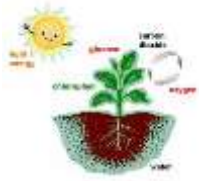
Aerobic Respiration

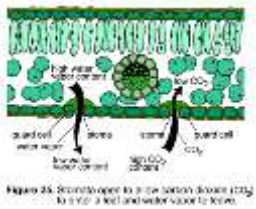


- Animals
  - Lungs (mammals, reptiles, birds, amphibians)
  - Diffusion through the skin (amphibians, worms)
  - Gills (fish and sharks)

Respiration

- Plants





Aerobic Cellular Respiration

- Occurs in the mitochondria of animal and plant cells!

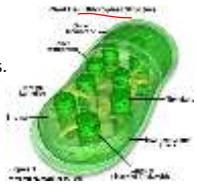
glucose + O_2 -> CO_2 + H_2O + ATP

Anaerobic Respiration

- **Alcoholic fermentation** occurs in **yeast** and some bacteria, and produces CO_2 and ethyl alcohol.
- **Lactic Acid fermentation** occurs in **muscle cells** and bacteria. A build up of lactic acid is what causes muscle soreness.

Photosynthesis…..

- Occurs in the presence of light and in the chloroplasts of plants, and some protists such as algae.
- The sun's energy is used to make sugar (glucose).
- Polymers are formed from simpler ones.
- CO_2 + H_2O -> O_2 + glucose
  reactants product



…..Respiration

•Occurs at all times in cells.
• Releases ATP energy from Mitochondria
•Complex substances are broken down into simpler ones.
•Carbon dioxide and water are the end products.
•Oxygen is taken in.

Nutrition

- Autotrophs- organisms that can make their own food (photosynthesis).
- Heterotrophs- organisms that consume food or decompose food.

Reproduction

- Sexual- gametes are needed to create offspring with variation.
- Asexual- gametes are not needed because an organism makes an exact copy of itself.

Sexual Reproduction

- **Animals- egg and sperm make a zygote**, which grows into an embryo, which grows into a fetus
- **Plants- egg and pollen sperm make a seed** which germinates.
- **Plants and Fungi- some make spores**


Internal Fertilization

- Egg and sperm unite inside the organism.
  - Mammals- nourishment by the placenta
  - Birds
  - Reptiles

Nourishment by amniotic egg

External Fertilization

Water is needed for fertilization Egg and Sperm unite outside of the organism.

Amphibians http://www.youtube.com/watch?v=q50Yphp1gzI

Fish http://www.youtube.com/watch?v=yn4Oubl4lh4

Ferns http://www.youtube.com/watch?v=c4YtOT0Z6Ek

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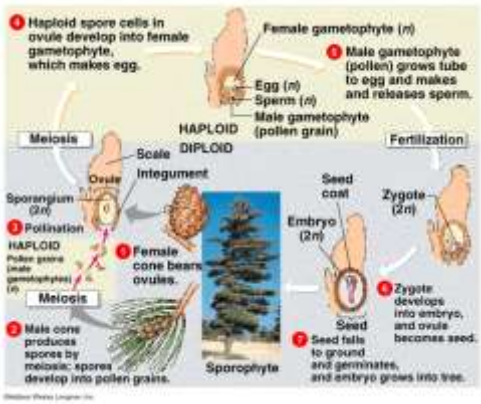
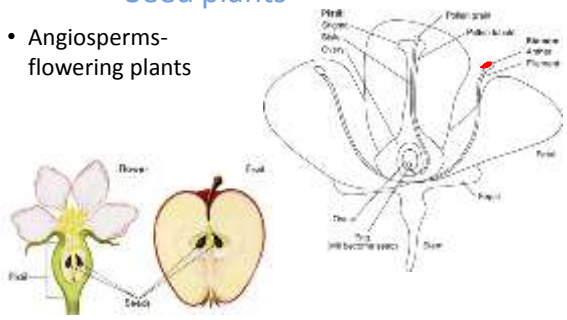
Seed plants

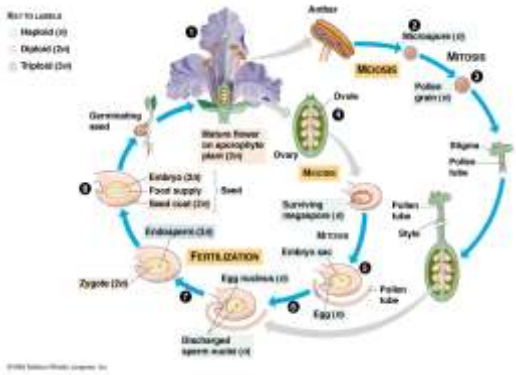
- Gymnosperms- cone bearing plants

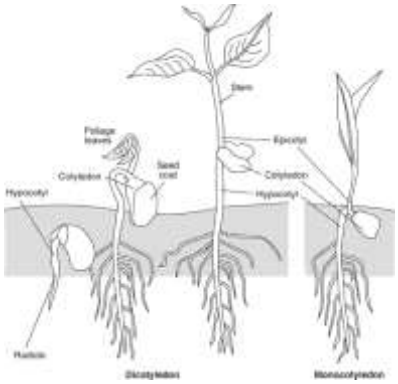



Seed plants

- Angiosperms- flowering plants







Suckling (Innate)

Behavioral Adaptations

- As an organism develops special behaviors which are

  Innate behavior or

  Learned behaviors

  and important for survival.



Taxis (Innate)

- Chemotaxis (Termites release pheromones for communication)
- Phototaxis (Plants response to light)

http://www.youtube.com/watch?v=uqDwvuleRYc

Estivation / Hibernation (Innate)

- A state of lower metabolic activity

Estivation- summer; heat and drought

http://www.youtube.com/watch?v=ZUsARF-CBcI

Hibernation- winter; cold and drought

http://www.youtube.com/watch?v=ZFb_P2vZ0kc

Habituation (Learned)

- Habituation is when an organism stops responding to a stimulus after repeated exposure.

http://www.youtube.com/watch?v=Kfu0FAAu-10

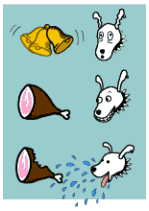
Imprinting (Learned)

- Imprinting is learning that occurs early in development that cannot be changed such as ducks and geese recognizing the first person they see as their mother.

http://www.youtube.com/watch?v=MxxrDEbtuag

Classical Conditioning (Learned)

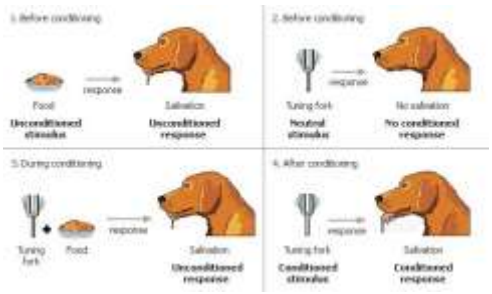
- Stimulus association
- Ex: Pavlov's dogs

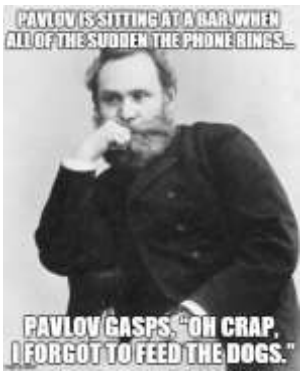


Bell = dog salivating because he associates it with food.

https://www.youtube.com/watch?v=nE8pFWP5QDM

Classical Conditioning





Trial and Error (Learned)

- Rewards and punishments

Camouflage Camouflage

- To look, act, smell or sound such that it blend in with their surroundings.

http://www.youtube.com/watch?v=PmDTtkZlMwM
http://www.youtube.com/watch?v=k3ZkGjgQ9Kg

http://www.youtube.com/watch?v=Rqi3jpBSyCc

http://www.youtube.com/watch?v=67Qlq8DBtl4

Adaptations

- North American Porcupine
- Eastern Chipmunk
- Arctic Fox
- Virginia opossum
- Beaver
- Desert Animals

Critical Thinking

- What structural adaptations do animals and plants have for feeding, reproduction and life on land?
- What behavioral adaptations do organisms have that help ensure survival?
- What are the reproductive advantages and disadvantages of internal and external fertilization?
- How do specific physiologic processes of transport, excretion, growth and development foster survival?