

February 13, 2015

Cellular Energy

Outline

- Cellular Energy: 3 processes
 - o Photosynthesis
 - o Chemosynthesis
 - o Cellular Respiration

Announcements

- Quiz 3 and Critical Thinking #2 due on Sunday. 11:59 pm

Energy

- Energy: ability to cause change or do work
 - o We need energy to be alive
 - Reproduce, digest, and exist
- Kinetic Energy: energy associated with motion
 - o Heat: Thermal energy
 - o Solar Energy: light energy from the sun
- Potential Energy: energy in matter related to its position or structure
 - o Molecules have potential energy in chemical bonds
 - o Chemical energy: potential energy released by chemical reactions

Chemical Reactions

- Endergonic Reactions: transforms energy from one form to another
 - o Products have more energy than reactants
 - o Energy absorbed from environment and stored in products

- Ex) Photosynthesis
- Exergonic Reactions: Release energy from energy that's stored in the reactants
 - o Products have less energy than reactants
 - Lost energy is usually released as heat
 - o Heat released to environment
 - Ex) Burning wood
 - Releases energy stored in the carbons of the wood

Adenosine triphosphate (ATP)

- Where cells get their energy
- Structure
 - o Adenine: nitrogenous base
 - o Ribose: sugar
 - o 3 phosphate groups
 - Negatively charged
 - Unstable bonds easily broken by water (Hydrolysis)
 - o Adenine→Ribose→3Phosphate Groups (→= connection)
- Releases energy by transferring phosphate group to another molecule
 - o "Phosphorylation": adding of the phosphate group to another molecule
 - o Energizes molecule (Transfers energy)

Clicker Question

- The initial energy input to nearly all ecosystems on the planet comes from
 - a) Water
 - b) Soil

c) Sun

d) Moon Burger King

All Cells Need Energy

- All cells regardless of their type
- Light energy is main source of energy input in the world
 - o Light energy is absorbed by Chloroplasts (sites of photosynthesis)
 - Release organic molecules and oxygen that are used in cellular respiration
 - o Mitochondria breaks down glucose (Site of cellular respiration)
 - Bi-products are reactants for photosynthesis
 - Releases ATP and Heat energy

Autotrophs

- Autotrophs self-feed and are Primary Producers
- Provide initial source of energy for ecosystems
 - o Source of organic molecules for most other organisms
- Autotrophs: Primary Producers= convert energy for the rest of the ecosystem
 - o Terrestrial Systems: Plants
 - o Aquatic Systems: Phytoplankton
 - o No Sunlight: Bacteria and Archaeobacteria
- Consumers: heterotrophs: consume organic material from other organisms
 - o Have to gain energy by eating
 - o Herbivores and Carnivores eat living organic material
 - o Decomposers: eat dead or bi-products of organic material
 - Recycle energy