Jonathan Quang 9/27/14

3rd Period Biology

Homework #5

Fill in the Blank:  
1.created, destroyed, kinetic, potential  
2.more, less, organized, entropy  
3.exergonic, endergonic, exergonic, endergonic, coupled  
4.adenosine triphosphate, energy carrier, adenosine diphosphate, phosphate, energy  
5.proteins, catalysts, activation energy, active site, substrates  
6.inhibiting, competitive inhibitor, allosteric

Applying the Concepts:

1. Increasing entropy in the sun eventually results in the expenditure of electrical energy in a vacuum to decrease entropy in the room. When the sun goes through nuclear fusion, its entropy increases as heat, protons, and radiation are released. These ultimately heat up the planet and fuel the development of plants. Heating up the planet eventually causes rain and wind. Rain leads to hydroelectric power and windmills to make electricity. Solar panels runs off the protons of the sun. Fossil fuels were originally plants that required the sun's energy to grow and reproduce. These are all methods of electricity production available to generate electricity that is used to power the vacuum. As the vacuum cleans the room, it "orders" the room, decreasing entropy.  
2. The digestive system produces separate enzymes for digesting proteins, fats, and carbohydrates instead of breaking all down by hydrolysis reactions because breaking all down purely by hydrolysis would be inefficient. Producing enzymes for each biological molecule lowers the amount of activation energy required to get water to split the polymer into its monomers. The enzymes also allow for specifically water and the polymer to come in contact with one another.  
3. The argument that evolution is false because increasing complexity of organisms through time contradicts the second law of thermodynamics, is false itself. The second law of thermodynamics requires that energy is added to a system for it to maintain complexity. The argument fails to acknowledge that the sun is adding energy to life on Earth, which allows Earth to maintain and develop further complexity.  
4. When a bear eats a salmon, the bear cannot use all the energy contained in the body of the fish because some of the energy in the fish cannot be digested and comes out as fecal matter. The energy used to produce the indigestible parts of the fish would then be lost. Based on this conclusion, a natural system, such as a forest, would have more prey animals than predator animals. Energy is always lost as a predator eats its prey. Thus a population of predators would need a larger population of prey to sustain the energy lost when prey is eaten.

Enzymes in the Real world: Internet Research- Global Warming Effects on Fish and Other Cold Bolded Organisms :

1. Organisms that cannot regulate their own body temperatures are ectotherms. These are typically reptiles, fish, amphibians, some unicellular organisms, etc.  
2.The optimal temperature for most enzymes in warm-blooded animals are around 37◦C.   
3.Cold water fish living in water that is a few degrees higher than usual would have higher metabolic rates. They would require more food to eat to sustain its metabolic rate, or else they would face death from lack of energy.  
4.In humans, an elevated temperature, such as a low fever, may be beneficial because the enzymes in bacteria that causes illness may not function properly due the increase in temperature. This may effectively stop the illness. Some studies suggest that a low fever increases the effectiveness of enzymes in the immune system. If the fever is too high, enzymes may denature. When too many enzymes denature, death may occur.  
5.Warm water fish may migrate into northern bodies of water due to global warming. This may affect the ecosystems present in the bodies of water because these warm water fish effectively have no predator. These fish then consume much more prey than the original predators. The original predators may die out, ruining the balance it maintained.

Enzymes in the Real world: Case Study and Internet Research- Lactose Intolerance:

1. Lactose is a type of carbohydrate. It is a disaccharide. Disaccharides are composed of two monosaccharides. The monosaccharides that compose lactose are glucose and galactose.  
2. Lactase is an enzyme that in the small intestine that catalyzes the hydrolysis of lactose into glucose and galactose.  
3. Substrate- A substrate is a molecule that enters into an enzyme for the reaction the enzyme catalyzes.   
Active site- The place on an enzyme where a substrate molecule binds to.  
4. Each enzyme has an active site with a unique shape and chemical properties (such as amount of electrons in a certain area). This allows for specific substrates to be accepted.  
5. If Pei was not lactose intolerant, the lactose in the substances that she consumed would have been digested by lactase enzymes. The resulting glucose and galactose would have been absorbed and transported to the blood. Galactose would have eventually converted into glucose via the liver. Pei's blood glucose level would have increased as a result. Due to the lack of increase, it can be concluded the Pei lacks the lactase enzymes to process lactose. Therefore Pei is lactose intolerant.