

Themes of biology



Leaf anatomy, food for plants and animals, plant functions, and plant and animal cells are all subjects that were highly mentioned throughout the first quarter. The theme of Energy Transfer is prominent in all of these topics. The Interdependence in Nature is also a theme that comes up especially in plant functions, plant and animal cells, and leaf anatomy. Although there were many different sub-themes after many experiments, research, and discussion in class, I find that the two main themes that were talked about this quarter are Energy Transfer and the Interdependence in Nature. The theme of Energy Transfer is very important when it comes to both plants' and animals' survival. Without energy transfer plants and animals would not be able to gain energy from the food they eat or the sunlight they absorb. Energy transfer is the process of converting one type of energy into another so that it can be used by the organism. For example, when we looked at how plants get energy we say that plants' main source of energy is sunlight. But, we noticed that light energy cannot be directly used by the plant. So, using the process of Photosynthesis plants can effectively turn light energy into "usable" or kinetic energy. This process consists of two sub-processes, light dependent and light independent. In a plant cell there is an organelle called the chloroplast. In each plant cell there are tons of chloroplasts, and in these chloroplasts there are little thylakoids which are little green disks. The thick skin of the thylakoid is called the grana which is where the light dependent sub-process occurs. Basically, light energy is used to power electrons which after going through an electron transport chain are combined with ADP and NADH⁺ to create ATP and NADPH which are usable energy. Then this energy becomes an input of the light independent process which takes place in the stroma. CO₂ and the two sources of energy enter the Calvin cycle (light

independent) and come out as glucose which can then go through cellular respiration to transfer its chemical energy into some thermal energy and some “useful” kinetic energy. Another example of energy transfer would be Cellular Respiration. Cellular respiration happens in animals all the time but plants only perform this process in the dark when they can’t get any sunlight to do photosynthesis. Cellular respiration is essentially when your cells breathe. Cellular respiration is a long process consisting of many sub-processes including aerobic respiration, anaerobic respiration, oxidation, dehydration synthesis, and the Krebs cycle but, essentially the main idea is that glucose and oxygen are taken in, and out of that we get CO₂, H₂O, and a usable source of energy or ATP. Both Photosynthesis and Cellular respiration are key examples of energy transfer, and key processes that must take place for animals, such as us humans, and plants to survive. The second most prominent theme talked about in the first quarter is Interdependence in Nature. For example, there is an interdependence between animals and plants in the sense that the amount of air animals breathe depends on how much O₂ is released by plants, which then depends on sunlight and the air’s CO₂ content. Photosynthesis, a process performed by plants, enables them to release oxygen, which then animals, such as humans, use to breathe, survive, and use for cellular respiration which also provides animals with energy. The last example of how there is interdependency in nature is that nature itself would not work without dependency on other organisms, biotic or abiotic. This is called an ecosystem and everything builds off of each other. If one link is taken out, the whole chain falls apart. Plants rely on sunlight to survive and produce O₂, animals rely on O₂ to survive and breathe and then exhale CO₂ which plants also

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need to produce O₂. This goes on and on forever, but basically the idea is that the only way for all of the different organisms to live, they all have to depend on each other.