

Carbon atom project assignment



Carla then turned around and saw that her friends were equally shocked. When all of them tried to come up with an explanation of what had just occurred, they felt a strong pull. This pull came from Cactus pear *Opuntia Ficus-indica*. *Opuntia* was ready to perform photosynthesis and nothing was going to stop her from using the friends of Carla and Carla. Without hope, Carla and her friends were unable to escape the cactus desires.

Photosynthesis in *Opuntia* does not work the same way as in C3 plants because *Opuntia* is a CAM plant.

Opuntia lives in a deserted region where it is hot and dry. Thus, *Opuntia* wants to conserve as much water as it can. To achieve this, the C4 pathway and the Calvin cycle take place at two temporal parts. In the mesophyll cell, at the C4 pathway carbon dioxide is hydrated to form bicarbonate ion, which reacts with enzyme, phosphoenolpyruvate, to produce the four-carbon compound, oxaloacetate. This process occurs at night when the stomata of the cactus are open and CO₂ (Carla) was diffused in. Oxaloacetate is then reduced to malate, which is stored as malic acid in the vacuole.

However, during the daytime malic acid is turned back into malate and is broken down to pyruvate and CO₂. Exhausted, Carla complains on the purpose for traveling to different locations. Poor Carla, she doesn't know that she is not even half way through her journey back home. Next, Carla and her friends are on her way to the Calvin Cycle, which occurs on the same mesophyll cell. Here, Carla goes to a cyclic series of chemical reactions by using energy from ATP and electrons from NADPH produced at the light reactions to form G3P, which is used to build glucose and other organic compounds.

Now, Carla is trapped in a glucose molecule that she can't get out of. She lives inside cellulose and is patiently waiting for someone to eat the plant so that she can have a chance to escape. However, months pass and nothing seems to like this cactus. That is because cactus has sharp spikes, which protect it from predators. No one even knew how to eat cactus. Except humans but humans had not passed by the desert for a long time. Until, one day a group of soldiers pass the Sahara desert to get to Morocco and fight against Spain. These soldiers seemed extremely angry.

All of a sudden, though, their faces enlightened when they see cactus. They all looked at each other and with their swords took down several cacti. They took the spines out and prepared tostadas de nopales (Mexican dish) that was shared among all including the horses. Indeed, it was a great day for the soldiers but not for Carla and her friends. That is because they found out that cellulose in the nopales couldn't be broken down by the human digestive system. Therefore, some of Carla's friends were stuck for a while but were then excreted. However, they were still not free CO₂ molecules.

The feces needed to be decomposed. Decomposition occurred when fungi and bacteria broke down organic matter like waste so that CO₂ could be released. On the other hand, the horses were able to break the cellulose down from the polysaccharide to the disaccharide and finally to a monosaccharide of glucose. Horses were able to digest cellulose because they contain special bacteria and microorganisms in their digestive tracts that break the cellulose down. Later on, the horses went through cellular respiration so glucose could be broken down even further.

This is the oment in which Carla and her friends have been waiting for. They have been awaiting their escape from the animal's body to reach the atmosphere as CO₂ gas. In order for this to occur, the glucose molecules that each of them are in, need to go through glycolysis. Glycolysis occurs in the cytosol and it allows for the splitting of glucose into two pyruvate molecules. Carla's friends and her finally get to the next station, pyruvate oxidation. Here pyruvate will turn into acetyl coenzyme A by releasing either Carla or one of her friends and reducing an NAD⁺ electron carrier to NADH (harvesting nergy).

However, only a couple of Carla's friends managed to escape. The rest of them were still stuck in the Citric Acid Cycle. Finally, the Acetyl CoA joins with oxaloacetate to undergo different stages and produce a variety of compounds using NAD, FAD, and ATP (energy is getting expended). Luckily, at this stage Carla and the rest of her friends were able to regain their freedom. However, they did not come out as carbon atoms for they figured that they had stepped into a new phase of their life. They were now all teenagers and being a teenager meant becoming carbon dioxide gas.

All of Carla's friends and her understood why they had gone through all those processes inside different organisms. Surprisingly, they were very excited for the next pull. The only fear and uncertainty they had was being unsure for when they would see each other again. Even worse, fearing that some CO₂ molecules would never find their way out. They knew how risky the journey could be. Some would get out in several days while others could take a million years. In any case, a new chapter of their life started and new journeys inside a plant, animal or human were about to begin.