The effect of transformation of pglo in bacteria

Science, Biology

Genetic transformation is a process that primarily is inserting new DNA into an organism to change that organism’s trait. This process has many useful benefits when used correctly in different organisms. In this lab, bacteria was transformed by inserting DNA for Green Fluorescent Proteins. The DNA for these proteins were taken from bioluminescent jellyfish Aequorea victoria. One of the main lessons of the lab is learning of the use of ‘ plasmids’. Plasmids are small pieces of DNA that usually code for one trait and are easily transferable between bacteria.

This transfer of plasmids between bacteria is actually extremely helpful for them and are key in their survival. The plasmid that codes for the Green Fluorescent Proteins is accompanied with a gene for resistance to the antibiotic ampicillin. To ‘ switch on’ the gene for fluorescence caused by the proteins, sugar arabinose must be added to the bacteria’senvironment. If there is no sugar arabinose introduced to the plates, then the bacteria will appear white and will not glow, even if the gene for the proteins is successfully inserted.

If the gene was successfully inserted and there is sugar arabinose present then the bacteria will glow a fluorescent green. The objectives for this lab is was to see the effects on bacteria in four different cases. The first case is the effect on bacteria when the gene for pGLO is introduced with LB (a ‘ broth’ like substance that bacteria feed off of) and ampacillin. The second case is the effect on bacteria when the gene for pGLO is introduced with LB, ampacillin, and sugar arabinose.

The third case is the effect on bacteria when no gene for pGLO is introduced, but LB and ampacillin is still introduced, The fourth case is the effect on bacteria when no gene for pGLO is introduced, but bacteria is still placed in a LB enriched environment. The hypothesis for the first plate is that bacteria will grow, however it will not glow even though the pGLO gene is introduced because there is no arabinose to effectively activate the gene. The bacteria will still grow although the ampacillin (which normally kills bacteria) is present because the pGLO gene also acts as a resistant to antibiotics.

The hypothesis for the second plate is that bacteria will grow and glow because the gene for pGLO is introduced with sugar arabinose to effectively turn it on. The bacteria will also not die although ampacillin is present because, alike to the first plate, the pGLO assists the bacteria in becoming resistant to antibiotics. The hypothesis for the third plate is that no bacteria will grow at all because it is an ampacillin enriched environment with no pGLO gene to help the bacteria become resistant to the antibiotic.

The hypothesis for the fourth plate is that the bacteria will grow normally because although there is no pGLO gene introduced, there is also no antibiotic to prevent the bacteria from growing. (AP Biology Development Committee, 2012) Data/Results: ? Figure 1. Recorded results from observing the transformed bacteria under light and in darkness After proper incubation time, we took the plates and viewed them with the lights on and then turned the lights off to see if any of the plates had colonies that glowed.

As seen in Figure 1, the first plate produced some bacteria (one colony) and did not glow. The second plate produced a decent amount of bacteria (eight

colonies) and ended up glowing. The third plate did not produce any bacteria at all leaving it impossible to see if anything glowed or not. The fourth plate produced the most amount of bacteria (ten colonies) and did not glow. Conclusion: All four of our hypotheses were correct after reviewing the results.

The first plate, that consisted of bacteria with pGLO in an environment of LB and ampacillin, produced colonies however they did not glow due to the fact that there was nothing to turn on the pGLO gene. There needed to be arabinose in the environment for the gene to be expressed and since there was not there was no glow. The second plate, that consisted of bacteria with pGLO in an environment of LB, ampacillin, and arabinose, produced a fair amount of colonies that did end up glowing. The bacteria glowed because the pGLO was successfully inserted and transformed and had the arabinose to express the gene.

The third plate, that consisted of bacteria without pGLO in an environment of LB and ampacillin, did not produce any bacteria. This outcome was due to the fact that ampacillin kills bacteria and there was no pGLO gene to help the bacteria become resistant to the antibiotic. The fourth plate, that consisted of bacteria without pGLO in an environment of just LB, produced the most amount of bacteria because although it did not have the pGLO gene to prevent antibiotics from killing the bacteria, there were no antibiotics to have to account for.

It makes sense that the fourth plate produced the most bacteria because although in both plates one and two there was pGLO to prevent the

ampacillin from killing the bacteria, not all of the bacteria were likely to go through transformation correctly and therefore not all of the bacteria had the pGLO ultimately resulting in the termination of a lot of potential bacteria colonies. (AP Biology Development Committee, 2012)