DGD #1

1. Prokaryotic cell division occurs by binary fission in which the genetic material, DNA, of the cell is replicated and two daughter cells are produced with identical circular DNA. The advantage of this mode of reproduction is that it is faster so it allows for a large amount of new prokaryotic cells to be formed in a short amount of time. This form of cell division is also advantageous in terms of evolution because the cells are able to pass on 100% of their hereditary genetic material. The disadvantage is that this form of reproduction produces simple structures with no genetic diversity, so if one cell obtains a dangerous mutation or genetic disease, that mutation or disease will be passed on to every daughter cell. In eukaryotic cell division, there is mitosis cellular division for somatic cells and meiosis for non-somatic cells. Mitosis is more sophisticated than binary fission because it multiplies membrane bound organelles while binary fission only replicates the genetic material. At the end of mitosis 2 daughter cells with identical DNA are formed, similarity with binary fission. In meiosis, the end products are 4 haploid cells containing different genetic material than their parents in non somatic cells. Both mitosis and meiosis allow for more complex and diverse cells to form that can carry out a variety of functions forming a larger more complex organism. As well, due to the greater diversity among cells and the organisms formed by eukaryotic cells, there is greater resistance to disease, since if one cell obtains a genetic mutation it will not always be passed on to the daughter cells and due to the different organelles making up the cell, there will not be a drastic effect in eukaryotic cells due to disease as in prokaryotic cells due to disease or mutation.

2. All in all the theory of endosymbiosis is valid because in order for the mitochondria and chloroplast to have started out as unicellular autonomous prokaryotes that were then engulfed by an anaerobic host cell, they must share similarities with aerobic prokaryotes and cyanobacteria. The first line of evidence is that the mitochondria and chloroplast similarly to aerobic prokaryotes and cyanobacteria have their own circular DNA (mDNA and cpDNA) that is distinct from the cell's DNA in the nucleus. The second line of evidence is that mitochondria and chloroplast similar to cyanobacteria and aerobic prokaryotes undergo cellular division by binary fission in which they replicate their genetic material and divide into two daughter cells. The third line of evidence is that the mitochondria and chloroplast both have a folded double membrane with an electron transport chain and similar enzymes as in aerobic prokaryotes and cyanobacteria so they have the ability to produce energy in a different way just like in aerobic prokaryotes and cyanobacteria.