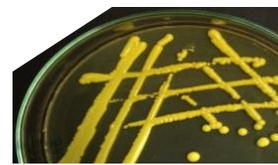


Protein synthesis in bacteria dependent on external stimuli.



https://upload.wikimedia.org/wikipedia/commons/f/fe/Micrococcus_luteus_Standard_I_13-Strich_47.jpg

Background

The strain *Micrococcus Luteus* is a part of the phylum called actinobacteria. This phylum contains bacteria that has an active role as decomposers of dead organisms. For a long time actinobacteria was thought to be a species of fungus due to its decomposing tendencies and mycelium growth like state. *M. Luteus* shares their gram-positive nature from the phylum they belong to. Actinobacteria do deviate from bacteria in the same phylum and thus is hard to find a lineage. This is because of the genetic variation in among the bacteria as they exist in many different types of ecosystems.

The strain *Escherichia coli k12* belongs to the phylum proteobacteria and thus is a gram negative bacteria, and also stains in that particular way, it's important to include that some organisms in this phylum may stain gram-positive or also gram-variable, and shall therefore not be confused with any other bacteria in the phylum. Which *E. coli* in generally used for study due to containing one set of their genome, meaning their haploid. Therefore, a phenotype will be more visible and easier to detect than if it were to be a diploid. *E. coli* has risen to be a bacteria under spotlight due the nature of research. The more an area has been studied the more questions will be asked around it, and *E. coli* is just one of those cells. Many basic molecular processes in this bacterium will have similarities to those of the human cells. This is thus a prominent bacterium for such research

Exposure will realign the osmosis as it works to reach an equilibrium of water of each side of the membrane. This will theoretically cause the water to escape through the semipermeable along the concentration gradient to reach this point of equilibrium. This has to be done by the usage of proteins due to how H₂O passes through the membrane extremely slowly. This will in turn increase the salinity concentration inside of the cell and cause it to shrink together due to it drying out.

The Ultraviolet light kills the bacteria by causing what is most of the time irreparable damage to the DNA. As the light initiates a reaction between two thymine molecules. Which is one of the bases that makes up the DNA. The pigment of the bacteria is responsible for protecting it from this, as it absorbs the harsh UV-light.

Purpose

The purpose of this study is to determine the capacity of the protein synthesis in *E. coli k12* and *M. Luteus* depending on outer stimulus defined as a stress factor. This is to answer what the protein production would look like if it were to be under stress.

Method

The method entailed exposing the bacteria through several different exposures. Bacteria was exposed to both different salinity concentrations which were 0.9%, 1.4% and 1.9%. Then there were agar plates which was exposed to either 254nm or 365nm. This were then divided up into different exposure rates, these were 5s, 10s and 15s. The incubation lasted by rule for 48 hours, in a temperature of 37°C. The colonies were then counted in an area of 1cm² at 3 different points on the plate. A later experiment was conducted in a similar way but with the use of a dilution series. But it was only conducted with the *M. Luteus*. This entailed doing a dilution series of four with a tenth of the previous solution.

Results

Dilution series agar plate	UV-radiation (seconds)					
	254 (5s)	254 (10s)	254 (15s)	366 (5s)	366 (10s)	366 (15s)
1.1	N/A	N/A	N/A	N/A	N/A	N/A
2.1	133	100	N/A	20	100	N/A
3.1	60	100	50	145	117	50
4.1	31	13	26	57	16	24

Figure 5. This table shows the average of each exposure. N/A meaning not applicable.

CFU follows the pattern of decreasing with a smaller wavelength.

The results from the first several runs were mostly inseparable and could in few cases see a difference of concentration. *E. Coli* sample was contaminated

Discussion

This study further underlines the capabilities of the pigment in *M. Luteus* were it was able to withstand extensive exposure to the ultraviolet light. This shows why they are able to adapt to so many different environments, the results from the study on the upper amazon river should come to mind.

During the *E. Coli* experiment a major number of plates had been contaminated by *M. Luteus*.

The method of which the bacteria was distributed over the entirety of the plate was faulty. As there was an excessive amount of water on the plate. And also why the bacteria was centered on specific points on the plate.