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Function of the Tryptophanase Operon in Bacterial Colonization of Fruit Fly's Intestine

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Project Summary- *Function of the tryptophanase operon in bacterial colonization of fruit fly's intestine.* Tryptophanase is a major gene in bacteria cell involved in indole-synthesis. Indole, a molecule like hormone, is involved in the induction of biofilm formation: a structured community of microorganisms encapsulated and adherent to a living surface (like intestine). Because biofilm-associated pathogenic bacteria may cause serious infections, it is important to understand how tryptophanase gene is involved in bacteria colonization of the guts. The expression of tryptophanase depends on the environment surrounding bacteria, especially when nutrients like sugars and amino acids are changing constantly. The project, designed by the PI with experience on the study of the tryptophanase gene in bacteria, includes a series of molecular biology procedures to obtain mutant bacteria useful to determine the role of the tryptophanase gene during colonization of the intestine of fruit flies, an easy to work animal model. This project would enable the student to acquire expertise in bacterial molecular biology and introduce him/her to solve practical biotechnological problems applying their knowledge in genetics, microbiology and biochemistry. The findings will also shed light on how the expression of the tryptophanase gene would benefit the survival of potential pathogenic bacteria in intestine; the results would introduce the student in the academic life trough the publication or presentation of his/her results in a scientific meeting.

Student Prerequisites- The student should:
Hold any academic standing, however had previous high-school courses related with genetics and biology.

Student Duties-The student would:

1) Learn basic microbiological and molecular biology lab procedures and how to elaborate a professional lab-procedures book. He would set-up a lab procedure to detect bacterial colonization of fruit flies' intestine by making bacteria that could be detected in tissue samples of intestine.
2) Set up the mutagenesis method to be used in generating the bacteria lacking of tryptophanase gene.
3) Determine the ability of the mutant bacteria to colonize fruit flies' intestine. The student would use several conditions, such as changes in food and usage of

antibiotics, to analyze the success of these bacteria in colonizing the fruit-fly's intestine.

4) Establish logical explanations about the results using established bibliography and determine the future experiments to demonstrate such explanations
5) Write a publication draft with the obtained results.

Faculty Supervision and Mentoring- Dr. Cruz-Vera would:

1) Guide the student during the first two weeks to recognize the correct bibliography to be used in the elaboration of the experimental procedures.
2) Everyday, closely supervise and direct the student during the hands-on work in the lab.
3) Have one meeting per week with the student to discuss his/her results. The lab book would be used to evaluate the student's performance.
4) Guide the student during the elaboration of the publication draft and his/her conference or poster presentation(s).