Cells are like small factories, where every process must be perfectly synchronized and localized. In complex organisms, such as plants and animals, this organization is achieved through organelles like the cell nucleus and mitochondria. Additionally, cells have special structures called membrane-less organelles. These organelles help organize molecules so they can interact more efficiently, which is necessary for functions such as DNA repair. Interestingly, simpler organisms, like bacteria, also have similar structures for organizing their processes. Studying these organelles in bacteria is challenging due to their small size. One such structure that forms under stress conditions, such as starvation, is polyphosphate (polyP). PolyP serves many functions, one of which is aiding bacteria in adapting to stressful conditions like starvation. Our project focuses on understanding how stress affects the behaviour of certain enzymes in the model bacterium *Escherichia coli*. These enzymes, known as proteases, act like scissors that cut proteins. Specifically, we will investigate four major proteases: Lon, ClpXP, ClpAP, and ClpYQ. We want to see how their localization and activity change in the cell when bacteria are subjected to stress and produce polyP. As part of this project, we will examine the interactions between polyP and the studied proteases. We will create genetically modified strains of *E. coli*, containing labeled proteases. This will allow us to track where these enzymes are located in the cell under normal and stressful conditions, through the separation of different cell parts and their analysis. Using fluorescence microscopy, we will observe how labeled proteases are distributed inside cells under different conditions. Our research will provide detailed insights into the impact of stressful conditions on the localization and activity of proteases in bacteria. Understanding these mechanisms can be used to develop new antibiotic therapy strategies, which are particularly important in combating antibiotic-resistant bacterial strains. Proteases like Clp and Lon may become targets for new drugs, as they play essential roles in bacterial survival under stress. Since similar enzymes exist in many types of organisms, our discoveries may have broader implications for understanding stress responses in more complex life forms. Shedding light on these fundamental processes, our research aims to contribute to both basic biological knowledge and practical applications in medicine, especially in developing new strategies to fight bacterial infections.