The Reaction of *Bacillus subtilis* to Stress

Dr. Matthew Cabeen is an assistant professor at Oklahoma State University. He received his PhD in molecular, cellular & developmental Biology from Yale University in 2010. During the interview, the article that was discussed on why and how “Use of a microfluidic platform to uncover basic features of energy and environmental stress responses in individual cells of *Bacillus subtilis*” by Matthew Cabeen was written. He emphasized that this research could help scientist eventually figure out how and what stressors *Bacillus* *subtilus* has in order to do better job in killing the bacteria to prevent the eventual spread of it to people. Unlike people bacteria are very small meaning that when it encounters some type of stressor such as ethanol or acid, it has to respond in some type of way so it does not die. Although it wanted to be known how these bacteria were able to counteract these stressors, there were some obstacles that had to be overcome. One of the problems was that it was difficult to only do testing on one cell at a time in order to get results of a single cell and not how the population would act to that stressor. These problems were overcome by using a microfluidic platform that aloud for Dr. Cabeen and his team to single out the bacteria and to keep the environment the same so the results were more accurate.

Something that Dr. Matthew Cabeen found particularly interesting about the findings of this research was that the results showed that there was an amplitude modulated response. This means that the larger the stressors the larger the response by the bacteria. Although in previous research their conclusions were that bacteria showed a frequency modulate response meaning that the larger the stressor the longer the response. Dr. Cabeen was not necessarily predicting that the bacteria would show an amplitude modulate response which he thought was very interesting that *Bacillus subtilis* did. The main reason he chose to work with the bacteria Bacillus subtilis is because it is a common model bacteria and they have an unusual stress complex. These bacteria, also has four different types of stressor proteins, and each of the stressors respond to a different type of stress. So, a question that Dr. Cabeen and his team asked themselves was that “what specifically does each stressors protein do and what kind of stressors does it actually bind with?” Since bacteria cannot see or think the way they react with the outside world would be by the proteins binding to something in order to get a reaction. The next step for this research would be to figure out what the stressors proteins are binding to.

This research was very interesting, trying to understand the different types of stress bacteria can go through and how they react to the multiple stressors. By understanding this it could lead to scientist understanding how bacteria especially Bacillus subtilis reacts to stressors and how they can overcome them in order to prevent infections from happening and spreading. Also by understanding how bacteria respond to stressors eventually scientist can also understand how the parasites and protozoa respond to stressors that might present themselves in the environment.

References

Cabeen MT, Russell JR, Paulsson J, Losick R (2017) Use of a microfluidic platform to uncover basic features of energy and environmental stress responses in individual cells of Bacillus subtilis. PLoS Genet 13(7): e1006901. https://doi.org/10.1371/journal.pgen.1006901