**End of Summer Report**

My research project is about finding a nanobody to bind to the surface glycoprotein of the Nipah virus. Nipah is a zoonotic virus found in fruit bats in Asia, and is very contagious and very deadly. Nipah uses its surface glycoprotein (G-protein) to bind to receptors on the surface of host cells, facilitating fusion of the virus into the host cell and allowing the infection to occur. By binding a nanobody to the G-protein, it is no longer able to bind to host cell receptors, inhibiting the virus from entering into the host cell. Nanobodies are able to be used in both humans and animals, so they can be used to target Nipah at the source in fruit bat populations, before it has the chance to infect humans.

This summer I worked on creating a recombinant plasmid containing the G-protein DNA. I started with the DNA for the G-protein and a CMV plasmid containing an Alzheimer’s gene. I used PCR amplification to produce sufficient quantities of the G-protein DNA. I also performed restriction digests to cut the Alzheimer’s gene out of the CMV plasmid and to create matching ends on the CMV plasmid and the G-protein DNA. My PCR amplifications and restriction digests were successful, which was confirmed by gel electrophoresis. I then had to perform PCR and gel clean-ups after each step to remove the unwanted reagents. The next step of this process would be a ligation to put the G-protein DNA where the Alzheimer’s gene had previously been located, creating the completed recombinant plasmid. However, I was unable to reach this step because the PCR and gel clean-ups resulted in significant loss of DNA. I tried many different approaches to solving this problem, including increasing the amount of DNA used in the digests, increasing the incubation times, and ordering new materials. I was able to increase the amount of DNA left after the clean-up, but still not to a sufficient degree to be able to move on to the ligation. As a result, we have decided to order the fully recombinant plasmid from an external source in order to continue with the project. Although I wasn’t able to make the recombinant plasmid myself, I have become well-versed in the techniques required for this project and therefore feel that I have had a very productive summer.

This fall, I will put the recombinant plasmid into bacterial cells and grow it up. I will then harvest the plasmid and insert it into chinese hamster ovary (CHO) cells. The plasmid contains the G-protein which is a fully glycosylated protein, which bacteria cells can not produce. This is why I will switch it into a mammalian cell type. I can then isolate the fully glycosylated protein from the CHO cells and attach it to magnetic beads. These beads will be introduced into a yeast library containing billions of nanobodies, and the nanobody that is best able to bind to the protein on the beads will be selected.

To the Orpha Leiter Irwin Fellowship - Thank you for giving me the opportunity to participate in Albion’s FURSCA program this summer. This summer provided many benefits that will greatly influence my future education and research endeavors. Thank you!