2024 Buck Summer Scholar: Anna Buretta

My name is Anna Buretta, and I am a rising sophomore at Princeton University majoring in neuroscience. I am interested in researching synapse function in neurodegenerative diseases, such as Alzheimer's and Parkinson's disease.

Over my gap year, I worked in Dr. Michael Kaplitt's lab at Weill Cornell Medicine, studying gene therapy to treat Parkinson's disease. Parkinson's disease is characterized by loss of controlled movements, such as tremor, stiffness, and slowed movements. These behaviours are driven by a loss of dopaminergic neurons in the substantia nigra (part of the brain involved in coordinating and producing movement). In the Kaplitt lab, I worked on examining the neuroprotective effect of the Akt/PTEN pathway in dopaminergic neurons using a Parkinsonian mouse model.

This summer, I worked in the Tracy lab, which researches how synapses (the connections between neurons) are disrupted in disease. The lab focuses on how tau, the microtubule-associated protein, can affect memory and synapse health in diseases such as Alzheimer's and Frontal temporal dementia (FTD). In the Tracy lab, I worked under Ph.D. candidate Doyle Lokitiyakul to study molecular mechanisms of memory formation. Memories are encoded in connections between neurons, and the strengthening of neural connections drives memory formation. To strengthen connections, new receptors are trafficked to the post-synapse, sensitizing the post-synaptic neuron to the pre-synaptic neuron. The production of these new receptors relies on a phenomenon called local translation, where free floating mRNAs are translated following external stimuli. In the Tracy lab, I studied a translation initiation factor which we believe to be important in regulating the local translation of new receptors. I examined interactions within the translation initiation complex and other proteins involved in local translation. I also explored the post-translational modifications that regulate the activity of the translation initiation factor. Lastly, I investigated the translation initiation factor's ability to rescue translation of new receptors in FTD neurons. Through the experiments, we hope to characterize the mechanism that the translation initiation factor uses to promote memory formation.