I am applying for a Student Support Grant (research funds) to continue my work on the evolution of feral pigeons along the East Coast. I am using feral pigeons because they are a ubiquitous urban organism and allow me to test how genetic drift (evolution due to random sampling of organisms) occurs in urban environments. Specifically, I am requesting funds for laboratory supplies that are essential for the genetics portion of my dissertation.

Human populations are rapidly increasing around the globe which is leading to an expansion of urban areas to accommodate these growing populations. However, these human-altered landscapes lead to drastic changes in the natural environment including increased impervious surface cover (such as buildings and roads), increased air pollution, increased environmental toxins, increased light pollution, and increased habitat fragmentation; while at the same time decreasing the abundance of native plants and animals. Urbanization also leads to environmental convergence—where cities around the world are more similar to each other than they are to their surrounding unaltered environment. This convergence between cities provides a natural experiment, allowing me to compare multiple cities as urbanization replicates. I have chosen to focus my research on seven cities in the Northeast Megacity (Boston, MA; Providence, RI; Hartford, CT; New York, NY; Philadelphia, PA; Baltimore, MD; and Washington, DC) because these cities share similar attributes including climate, amount of impervious surface, and species composition.

I have collected blood and tissue samples from 677 feral pigeons in the Northeastern, United States and I am in the process of extracting and sequencing DNA from these samples. With the sequence data I will use computer models to test: (1) if the Northeast Megacity pigeon population in a city is a single genetic population, (2) if cities that are physically closer to each other have pigeon populations that are more closely related and (3) what patterns (city size, geographic layout, timing of pigeon introduction, age of city) influence the population genetic structure. My results will help us better understand how organisms evolve in urban areas, and how urbanization structures the distribution of animals.

The funds I am requesting here will allow me to continue my research and include all the samples I have collected. I originally planned to sequence approximately 350 samples, however I was able to collect more samples than I originally anticipated thanks to a partnership with the Wild Bird Fund, a Manhattan based wildlife rehabilitation center, and the United States Department of Agriculture (USDA) at the LaGuardia Airport. The USDA is responsible for maintaining wildlife-free airfields and controls pigeons populations in and around the airport. The Wild Bird Fund has generously sampled 144 of their pigeon patients for me, and the USDA has provided 162 pigeons, drastically expanding my New York City sampling far beyond what I
could have collected on my own. With this larger sample size I will be able to answer questions specifically about New York City pigeons such as: (1) are pigeons in New York City a single genetic population, (2) are flocks comprised of a single family group or many unrelated individuals, and (3) are New York City pigeons mostly comprised of escaped racing pigeons, or do other pigeon breeds contribute to the feral population?

My PhD advisor, Dr. Jason Munshi-South, has agreed to cover a portion of the supplies needed to sequence my samples and I am using the funds from my Clare Boothe Luce Professional Development grant to cover sequencing. Unfortunately this work is incredibly expensive, therefore I am requesting support from the Student Support Grant to fund the additional supplies needed to sequence all the samples that were collected. By including the additional samples we will gain a more complete understanding of the evolution of pigeons in the Northeast (and specifically New York City) and be able to better understand how urbanization shapes the distribution of organisms.

References