Department of Biological Sciences

Khadeejah Bari

Mentor: Matthew Wallenfang

Aging in germ line stem cells of male *Drosophila*

During the summer of 2006, I worked with Professor Matthew Wallenfang who studies the aging process in male fruit flies. We worked under the hypothesis that inefficiencies in mitochondrial metabolism cause aging by giving rise to highly reactive molecules derived from molecular oxygen. We wanted to know whether an accumulation of these reactive oxygen species in the stem cells causes aging. We examined stem cells because they are the most prone to accumulated damage.

We studied aging in the “germ-line” stem cells of male flies by noting the rates of cell division in these cells. Prior work has shown that the rate of [stem] cell division decreases with increasing age in flies. We therefore identified in S-phase, when DNA is replicated, and we marked them using the BrdU labeling technique. BrdU is a labeled nucleotide that is incorporated into the DNA of cells in S-phase. We dissected male flies, incubated live testis tissue in BrdU, and used fluorescently labeled antibodies to see which cells contained the label.

I looked at two aspects of how reactive oxygen species affect aging: the first was the production of these species, causing the degradation of essential molecules; the second was the degradation of these species themselves by specialized enzymes. I conducted two experiments, which were designed to be complementary. In one experiment, we artificially increased the concentration of reactive oxygen species within a cell by administering the drug paraquat. In the second experiment, we followed the fate of these artificially induced molecules as they were removed from the cell by the over-expression of an enzyme called superoxide dismutase.

In addition to these two experiments, I was exposed to various protocols for fly dissections and antibody staining. Also, I learned about proper fly maintenance. My most exciting and useful activity, however, was learning fluorescence and confocal microscopy, the former in a brand new lab at Barnard.