Ramapo Honors Thesis Research Summary

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I have worked with Dr. Monen for the past three years on several different projects which all focus on understanding the process of cell division in the nematode *Caenorhabditis elegans*. During my sophomore year, I assisted in the creation of a live imaging technique for observing mitosis and meiosis in *C. elegans*. I contributed the design for a three-dimensionally printed slide with a large opening in the center. This design allowed easy access to single-cell embryos while they underwent their first mitotic division. This allowed us to further study the role of specific proteins in mitosis. The centromeric protein CENP-A, which is critical for kinetochore deposition and chromosome segregation in mitosis is uncoupled from kinetochore assembly and not required to segregate chromosomes during meiosis. *C. elegans* have 2 CENP-A homologs; HCP-3 and CPAR-1. HCP-3 plays a conserved centromeric role critical for mitotic chromosome segregation, whereas CPAR-1's role has yet to be determined.

Recently, it has been shown that the protein CPAR-1, which localizes to meiotic chromosomes, is cleaved by the cysteine-protease Separase at the metaphase-to-anaphase transition during Meiosis I. Using the nematode *C. elegans*, an RNAi approach coupled with live imaging and immunofluorescence can help to elucidate the role of Separase-mediated cleavage of CPAR-1 in meiosis. The imaging techniques being utilized employ the use of a Zeiss Axiovert 200M epi-fluorescent microscope. Two different protocols have been used

environment for dissection and an agar pad for slide preparation. T

meiosis media to provide an improved environment for dissection,

printed slide with a system of cover-slips for slide preparation. The second technique has proved to be more successful as the nematode embryos persist long enough to undergo both meiotic and mitotic processes without arresting. This allows for video capture of the first embryonic mitotic division from beginning to end.

During my junior and senior years, I wanted to focus more on the production and utilization of proteins relevant to my previous research experience. I focused specifically on antibodies which have a broad range of research applications in cell biology. Their ability to bind