

**Summer Scholarship, Creative Art and Research Program
Abstract**

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Name of Project: Using CRISPR/Cas9 DNA-editing technology in *Hydra* to experimentally modify the levels of proteins associated with aging

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Members of the simple invertebrate species *Hydra vulgaris* have the potential to provide new insights into the biology of aging. Studies suggest that members of this species may be able to survive indefinitely without a decline in health or an increase in mortality rates. Past research in our lab has focused on genes which protect cells from damage over time in other organisms. Students have found that a number of these genes are expressed at high levels in stem cells in *Hydra*. To characterize the specific functions of some of these genes in *Hydra*, we would like to experimentally inactivate individual genes and then determine the effects of each change on cell populations within the modified *Hydra*. We are using the CRISPR/Cas9 system, a relatively new but inexpensive and easy-to-use approach to producing targeted modifications in DNA. As initial test of the system in our lab, we are working to replace a gene encoding Red Fluorescent Protein (in a strain of *Hydra* kindly provided by Dr. Rob Steele of the University of California) with one encoding Green Fluorescent Protein. We are also working on inactivating the *Hydra* PTEN gene, one of the genes that may be involved in maintaining *Hydra* stem cell populations.