

*Public Seminar*  
*Oral Examination in partial fulfillment of the requirements for the Degree of*  
*Doctor of Philosophy, Biology, New Mexico State University*

# **HORMETIC ABIOTIC INTERACTIONS OF STRESS IN INSECTS**

**MR. RAYMOND BERRY III**

**Wednesday November 11, 2020 3:30 pm MST\***



*Abstract. Hormesis can be protective as a multifarious response that results in upregulation of genes and organismal performance. The protective effects of hormesis in animal models includes improved survival, mating, extended longevity, and improved performance at old age (i.e. mating); amongst others. The sun is a source of energy used by terrestrial life in many trophic levels allowing for exposure to irradiation (UVR), a natural environmental stressor that increases production of reactive oxygen species (ROS). This type of environmental stress is damaging by attacking lipids, proteins and DNA. Exposure to prolonged UVR conditions early in life (pupae) leads to changes in performance later in life. This response can be classified as preconditioning, pretreatment, conditioning, or cross tolerance. Previous studies scantily provide appropriate levels of exposure needed for UVR hormesis that would increase production of ROS and antioxidant enzymes. The age of the individual at the time of treatment can have dramatic effects on hormesis with low dose UVR effects that induce protection, an extension of normal life span and improved organismal performance shown in other insects (Calabrese 2013). The vinegar fly, *Drosophila melanogaster*, was exposed to UVA at different intensities. Vials containing pupae, separated from food and kept in same vial were exposed to 0, 30, 45 or 60 minutes of ultraviolet radiation A ( $\lambda = 365$ ). Different rates of UVA exposure ( $mW/m^2$ ), produced by the distance from the source, show slight differences in treatment survival/adult emergence and flight ability. Low doses of UVR lead to protective and beneficial responses, while exposures to high doses are damaging and detrimental. Ultimately, data such as these can be refined to develop a model of dose response that can be used to estimate hormesis, or the biphasic response. Support: NIH RISE4; NIH RISE5; Graduate Assistantship from the State of NM*

**Attendees will receive instructions for accessing the Zoom  
meeting 24 hours prior to the seminar.**





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3:30 pm Mountain Time

*Raymond Berry III was born in Tacoma, Washington and calls Killeen, Tx home. As a first-generation college student, his experience has motivated him to pursue a bachelor's and master's in Biology at Sam Houston State University. He spent the last four and a half years working towards his PhD in Biology here at New Mexico State University. Raymond is a dedicated, detailed and capable RISE fellow with 6 years of experience in graduate-level biological research. He is a confident presenter at conferences with a 1<sup>st</sup> place international award at the Entomological Society of America Conference in the fall of 2018. He is a poised teaching assistant in Human Physiology laboratory and can explain complex information to audiences of all levels. His recent portfolio achievements include publishing in the comparative stress physiology journal with focus on hormesis.*



*Mr. Berry's dissertation research is overseen by Giancarlo López-Martínez who received several bachelor's, a master's, and a PhD from the Ohio State University. He spent the last nineteen years studying the effects that abiotic stress can have on organismal performance and fitness. His research focuses on the long-term effects that environmental stress can have on animals, specifically how free radicals and oxidative damage affect behavior, performance, lifespan, and healthspan. His research into the effects of stress often utilizes hormetic approaches to identify the positive effects of stress.*



*Dissertation Committee: Dr. Giancarlo Lopez Martinez (Research Advisor); Dr. Elba Serrano, Chair; Dr. Graciela Unguez, co-Chair; Dr. Peter Cooke, member; Dr. Henrietta Pichon, Dean's Representative*

