Effect of Substratum on the Development and Release of the Triactinomyxon Stage of *Myxobolus cerebralis* in Mitochondrial DNA 16S *Tubifex tubifex* Lineages

Principal Investigators

Dolores V. Baxa, Staff Research Associate, dvbaxa@ucdavis.edu
Ronald P. Hedrick, Professor, rphedrick@ucdavis.edu

School of Veterinary Medicine
Department of Medicine and Epidemiology
University of California
Davis, CA 95618

Project Summary

This investigation examined the potential effects of substrate on the variability in production and release of triactinomyxon (TAM) spores of *Myxobolus cerebralis* from *Tubifex tubifex* belonging to the different mitochondrial DNA 16S (mt 16S) lineages. We have previously demonstrated that both TAM-producing (susceptible) and non-TAM producing (resistant) worms can arise even from known mt 16S lineage III TAM producers. Variability in TAM production may be influenced by two factors: 1) Genetic markers used for grouping *T. tubifex* are not directly related to mechanisms that determine resistance or susceptibility, and 2) substrate type may alter parasite development and infectivity. To determine potential mechanisms that may be associated with phenotypic differences among *T. tubifex* lineages due to sediment type, we designed a study to evaluate the effects of sediment (mud and sand) on the development and release of *M. cerebralis* among laboratory populations of oligochaetes from lineages deemed more susceptible (III) or resistant (I, V, VI) to the parasite. The impact of sediment in lineages known to contain only parasite resistant worms to date (e.g. V, VI) was also assessed to determine if parasite development and infectivity could be altered by changes in substrate.

Our study demonstrates that substrate type greatly influenced TAM production in susceptible lineages (i.e. III). Oligochaetes with fully developed stages were more prevalent in mud with greater number of TAMs produced in contrast to lineage III worms held in sand. Development and release of *M. cerebralis* were not observed in lineages V and VI in both sand and mud sediments suggesting that the lack of infections in resistant lineages may not be tied to other environmental factors such as sediment type. Low prevalence of infection was observed in lineage I worms from which the parasite failed to develop fully to mature sporogonic forms precluding TAM production and release in both mud and sand sediments. While sediment type was not shown to affect severity of infections among susceptible phenotypes in lineage I, low infection prevalence may be associated with the greater number of resistant worms present in this lineage that were not also influenced by sediment. Bacterial composition was assessed in lineage III worms from which sediment impact was significantly observed. Diverse species of bacteria were present and even unique species were identified from lineage III worms held in mud or sand. However, relationships between bacterial composition and parasite development and severity of infections were not established in this lineage in the current study. These studies demonstrate that sediment may influence the severity of infections of worms in lineages deemed to contain the most number of worms susceptible to the parasite (i.e. III) while parasite development and infectivity cannot be altered in lineages containing only parasite resistant worms (V, VI) or in lineages with more resistant phenotypes (I) regardless of sediment type.