Abstract - L. Harshman Seminar

A series of studies on *Drosophila melanogaster* lines selected for starvation resistance is the subject of the first part of the seminar. Several selection experiments are to be described. The correlated responses to selection include physiological parameters such as body composition, intermediary metabolism enzyme activities and respiration rate. Increased lipid abundance is typically an indirect response to selection which makes evolved starvation resistance useful for the study of fat accumulation (obesity). Lipid dynamics during the course of starvation and in different body locations are investigated. Multiple stress resistance is a correlated response to selection. Life history traits are also investigated including fecundity and life span. Increased life span is sometimes a correlated response to selection for extended longevity. Microarray studies are conducted comparing the selected versus control lines. In the selected lines, robust upregulated gene expression is found in different gene ontology categories than the relatively downregulated genes. The genetic architecture of evolved starvation resistance is investigated by quantitative trait locus (QTL) mapping using recombinant inbred lines (RILs) and hitch-hiking mapping using flies from the outbred selected and control lines. From study of the RILs, one QTL was found to correspond to greater survival under starvation conditions and increased life span. Hitch-hiking mapping reveals regions of the genome (QTLs) that have responded to selection. From the microarray study, genes that are differentially expressed in the genomic regions that have diverged in the course of selection are candidate genes potentially underlying the response to selection. The second part of the seminar is based on the hypothesis that evolved starvation resistance results in a suite of phenotypes that are similar to the consequences of dietary restriction as an environmental perturbation. Studies on dietary restriction at the University of Nebraska are described including work on superoxide dismutase activities, reduced glutathione and the transsulfuration pathway. Such studies can eventually contribute to an understanding of whether evolved starvation resistance and dietary restriction increase longevity by similar mechanisms.