



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Shirley Phan	Project Number S0417
Project Title Analysis of Dauer Formation in Various Caenorhabditis Species	
Abstract Objectives/Goals The objective of the project is to discover the molecular components underlying the evolutionary changes in development and physiology by comparing the dauer pathway (a developmentally arrested third larval stage that allows worms to survive when environmental conditions become adverse), in five <i>Caenorhabditis</i> roundworm species: <i>C. elegans</i> , <i>C. briggsae</i> , <i>C. remanei</i> , CB5161, and PS1010. Methods/Materials An EMS (ethylmethanesulfonate) mutagenesis was conducted to obtain <i>Daf-d</i> , worms that cannot form dauers under any circumstances and <i>Daf-c</i> mutants, worms that form dauers even when conditions are favorable to them are two classes of mutations that affect dauer formation. After <i>Daf-d</i> and <i>Daf-c</i> mutants are obtained, analysis such as, dye-filling assay to categorize the dauer mutants obtained, X-linkage tests to test for X-linked traits in dauer mutants, temperature assays and comparison of the level of <i>Daf-7</i> (promoter gene that plays a role in either inducing or preventing dauer formation) production were conducted to analyze how the dauer pathway has evolved in diverging <i>Caenorhabditis</i> species. Results A total of 24 <i>Daf-d</i> mutants were obtained through the EMS mutagenesis in the <i>C. briggsae</i> strain of which 8 out of the 1 was categorized as <i>Daf-d</i> cilium structure mutants. Two <i>Daf-c</i> mutants that are capable of suppressing dauer formation were also obtained in the <i>C. briggsae</i> strain. A significant difference discovered is that a <i>C. briggsae</i> SDS (Sodium dodecylsulfonate) sensitive mutant is not X-linked whereas the ancestral species <i>C. elegans</i> exhibits both SDS sensitivity and X-linked characteristic. Temperature assay demonstrated that <i>C. briggsae</i> , <i>C. remanei</i> , CB5161 and PS1010 are more heat tolerant and hyperinductive to increasing temperature than the ancestral species <i>C. elegans</i> . Results also concluded that the level of <i>Daf-7</i> production is higher in <i>C. briggsae</i> , <i>C. remanei</i> , CB5161 and PS1010 than in <i>C. elegans</i> . Conclusions/Discussion In conclusion, the various comparison experiments conducted validated that varying <i>Caenorhabditis</i> species such as <i>C. briggsae</i> , <i>C. remanei</i> , CB5161 and PS1010 exhibit both differences and similarities in gene function and gene locus that have been brought forth by evolution which is significantly different in <i>C. elegans</i> , the ancestor species.	
Summary Statement My project is to study and to better understand the molecular components of evolution by comparing a shared pathway, the dauer pathway in various <i>Caenorhabditis</i> species.	
Help Received Professor Paul Sternberg provided the equipment for my project; Dr. Takao Inoue supervised my experiments and helped me with technical difficulties.	