Name(s)

Vivek A. Banerjee

Project Number

J0401

Project Title

Sequence Comparison across Species as a Predictor of Gene Function

Abstract

Objectives/Goals
This study viewed the evolution of genes related to Serine Protease Inhibitor Activity throughout several species of Drosophila. The goal was to extend the theoretical predictions of sequence comparisons by appropriate molecular and genetic experiments.

Methods/Materials
Blast searches were done of the sequences of all genes related to serine protease inhibitors. E values and scores of all Drosophila species were recorded and missing spaces were filled with repeated in-depth blast searches. Drosophila melanogaster species was grown in lab cultures and analyzed for gene expression. Materials included Drosophila cultures, molecular biology equipment, reagents, and computer.

Results
Results showed in genes: Spn43Ad-PA, Acp62F, CG12807, and CG6663; in one or two drosophila species, the gene was either completely absent, or very close to non-existent. Species pseudoobscura turned out much different from any other species for several of the genes. Genes: Spn43Aa, Cg3790, PlxA, Tep11, Az2, Spn27a, CG14470, and CG1342 were very slow evolving and were found with seemingly no change between all species. Genes Acp76-Pa and Bg642378-Pb evolved very rapidly, and were found with varying change between all species. I attempted to demonstrate experimentally that the fastest evolving genes have functions related to reproduction.

Conclusions/Discussion
Sequence analysis across species was found to be a powerful method to identify genes with similar functions. In particular, the demonstration that some of the previously uncharacterized fastest evolving genes may have to do with reproduction, is consistent with their species specific function.

Summary Statement

Predicting gene function by sequence comparison and expression analysis.

Help Received

My father helped introduce me to the problem; Dr. Mukherjee at UCLA helped with experimental set up.