



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Holly Zhou	Project Number S0531
Project Title Bioinformatic Analysis of the Insulin Signaling Pathway in the Moon Jellyfish Aurelia	
Objectives/Goals The purpose of this project is to analyze the insulin signaling pathway in the moon jellyfish <i>Aurelia aurita</i> using bioinformatics. This study identifies the following components: the insulin receptor, the insulin-like peptide, AKT, EIF4B, FoxO, IRS, S6, P70S6k, PDK, PI3K, and PTEN. It also aims to lend insight into the evolution of signal transduction pathways on a large scale.	
Abstract	
Methods/Materials The <i>Aurelia sp1</i> genome was sequenced using Illumina 100 base pair paired-end reads. Once the files were unzipped, concatenated, and uploaded to claw6, the de novo assembly function of CLC Genomics Workbench was used to trim and remove low quality sequences. BLAST was used to query the translated nucleotide sequences of the <i>Aurelia</i> genome assembly with the amino acid sequence of a particular Hydra or <i>Homo sapiens</i> protein (if the Hydra sequence was unavailable). Results were then analyzed using Excel and DNA Strider.	
Results Seven insulin-like peptide genes were found in the <i>Aurelia</i> genome and 20 exons were found in the <i>Aurelia</i> InsR. The cDNA for Exon 4, the one most similar to the Hydra InsR, contains a tail, tyrosine kinase domain, and a transmembrane domain. There was one complete <i>Aurelia</i> sequence for AKT, IRS, FoxO, PTEN, P70S6k, and S6 and four components of PI3K: P85a, P85B, P110a, and P110B. No EIF4B sequence was found in <i>Aurelia</i> .	
Conclusions/Discussion These results indicate that the insulin signaling pathway is present across several phyla of metazoans and most likely evolved before their occurrence. The strong similarity between the Hydra and <i>Aurelia</i> AKT, IRS, FoxO, PTEN, P70S6k, and S6 indicates that these proteins perform homologous roles and are strongly conserved among Cnidarians. Because of the strong homology between species, results from testing done on the insulin signaling pathway in the moon jelly could be applied to humans and other organisms as well.	
Summary Statement My project analyzes the insulin signaling pathway in the moon jelly (amino acid sequences for the components, structural alignments, percent identity with other species) using bioinformatics.	
Help Received I used lab equipment at UCI under the supervision of Dr. Steele.	