



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

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Project Title Variability of MHC Class I Alpha 1 Gene in Selected Mammals	
Abstract Objectives/Goals MHC proteins play a significant role in the immune response as the recognition factor of all foreign antigens. This study is directed to show that because of their similar habitats and exposure to similar pathogens, the sequences of the variant segments of MHC Class I alpha 1 gene of marine carnivores will be more similar to other aquatic carnivores. As part of this study, I will sequence the MHC Class I alpha 1 gene in <i>Enhydra lutris</i> (sea otter), which has never been recorded and published by any scientist in the world yet. The terrestrial carnivore genome will also be more closely related to that of other terrestrial carnivores. Methods/Materials I sequenced the MHC Class I alpha 1 gene in three different individuals of both the <i>Enhydra lutris</i> (sea otter) and <i>Felis catus</i> (cat) by performing polymerase chain reaction (PCR), gel electrophoresis, gel extraction, cloning, restriction digest, and sequencing. Then I edited and analyzed my sequences using powerful Vector NTI software. I used the worldwide genomic database, BLAST, to search for the most closely related gene sequences, and constructed phylogenetic trees based on the similarity and absolute complexities of the sequences. Results I found in the DNA phylogenetic tree a closely related feliform group consisting of the cat, cheetah, ocelot, and cow. Another family that emerged was the caniform group, including the dog, sea otter, and harbor seal. Yet in the amino acid phylogenetic tree the only close relations left in the feliform group were among cat, cheetah, and ocelot, whereas the cow had been omitted. In the caniform group, the dog had been omitted in the amino acid phylogenetic tree. Conclusions/Discussion My results indicated that while DNA sequencing revealed certain groups of close relation, the functional amino acid groups had branched off differently, perhaps because of habitat and the exposure to similar pathogens. Amino acids construct polypeptides and in turn proteins, and are thus directly involved in protein structure and function, as opposed to DNA. Species of the same habitat showed considerable similarity in amino acid phylogeny. This study is only a small segment of a broad sector of genetic research that could bring huge implications to the health of animals across the globe. I recommend that more research on the factors influencing MHC proteins and their significance in the immune response be done.	
Summary Statement This study is directed to show that because of their similar habitats and exposure to similar pathogens, the sequences of the variant segments of MHC Class I alpha 1 gene will be closely related in animals of similar habitat.	
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