



**CALIFORNIA STATE SCIENCE FAIR  
2003 PROJECT SUMMARY**

<b>Name(s)</b> <b>Ranjeet Minocha</b>	<b>Project Number</b> <b>S0414</b>
<b>Project Title</b> <b>The Urea Transporter (UT) Family: A Bioinformatic and Phylogenetic Analysis</b>	
<b>Abstract</b> <b>Objectives/Goals</b> This experiment was undertaken in order to determine whether proteins of the Urea Transporter (UT) family are similar amongst different species, both eukaryotes and prokaryotes, and in addition, to trace evolutionary pathway of the protein. <b>Methods/Materials</b> This experiment was conducted using the following programs which analyze and look at the phylogeny and structure of the sequences: AveHAS, WHAT, IntraCompare (IC), TMS_ALIGN, BLAST <b>Results</b> Sequence, structural, and phylogenetic analyses reveal conserved regions and amino acid residues, suggesting that a primordial 5 trans-membrane helical segment (TMS)-encoding genetic element duplicated to give rise to a 10 TMS-encoding element early during evolutionary history, at about the time when eukaryotes diverged from prokaryotes. Two well conserved, strongly amphipathic, putative alpha-helices that precede both 5 TMS repeat elements are predicted to be of structural, functional, or biogenic significance. Further, a second duplication event (or a gene fusion event) occurred during development of the vertebrate lineage, giving rise to 20 TMS proteins in some mammals. These results suggest that vertebrates acquired UT genetic information from bacteria only once and that all current orthologues and paralogues in the animal kingdom arose from this one primordial system. <b>Conclusions/Discussion</b> The objective was met in that an evolutionary pathway was found and similarities of the UT protein family in different species was established. Using this same approach in a disease model can possibly help correct the malfunctioning part/s of the protein involved.	
<b>Summary Statement</b> This project is concerned with the evolutionary pathway and similarities of the UT protein in the different species that it is expressed.	
<b>Help Received</b> Used lab equipment at UCSD under Dr. Milton Saier; brother gave advice; students in lab helped with learning techniques; mom and dad for help with display	