



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Jacob B. Adler	Project Number J1001
Project Title Are There Genetic Relationships between Fingerprints in a Family?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of my project was to prove that the commonly held belief "fingerprints are not hereditary" and "fingerprints are completely random" is false.</p> <p>Methods/Materials I collected fingerprints from my relatives, my neighbor's family, and other people from different backgrounds and races. I had the participants place their thumbs on an inkpad then onto a piece of paper. I looked at each of the fingerprints and made a chart categorizing the fingerprints by the features they possessed. I compared people of different relationships and found how many features their fingerprints had in common and found the average number for each of the six groups I analyzed.</p> <p>Results Parents and children had an average of 5.06 features in common. Siblings had an average of 4.72 features in common and grandparents had an average of 3.90 features in common with their grandchildren. The parents and children group was further analyzed to determine the contribution of fingerprint features from one parent to the child compared to the other parent. The parents could be divided into groups with an average of 6.62 features in common with their child for the "dominant parent" group and an average of 3.69 features in common for the "less dominant parent" group. In contrast, non-related people had the lowest number of features in common with only an average of 2.66.</p> <p>Conclusions/Discussion The data shows that there is indeed a relationship between fingerprints of people in a family. All of the groups of related people had more features in common than non-related people. The data also suggests that fingerprints are passed down to a child in many cases through one parent more than the other parent, which is a typical pattern indicating the features are hereditary.</p>	
Summary Statement I analyzed the patterns of fingerprints of people of various relationships to see if there was a genetic relationship or if fingerprints were completely random.	
Help Received Parents helped me make the family trees using the "Reunion" program.	



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Kristen A. Aguanno	Project Number J1002
Project Title A Study of Killer Whale Respiration Rate	
Abstract Objectives/Goals My objective was to find out if the age of Orcinus orca affects the respiration rate to weight ratio. Methods/Materials I did my experiment at Sea World, San Diego and watched ten killer whales breath for 3 minutes for a total of 20 trials for each whale (200 trials total). My materials included ten killer whales at Sea World, a stopwatch, and 20 Whale Observation Logs. I was able to identify and keep track of the whales by working closely with the Education Department members and the whale trainers. Results The results of my experiment was the three younger whales' respiration rate to weight ratio was approximately 5.0. The four middle aged whales' respiration rate to weight ratio was approximately 1.0. The three adult whales' respiration rate to weight ratio was approximately 0.5. I found out the age of Orcinus orca does affect the respiration rate to weight ratio. Conclusions/Discussion The results show that my hypothesis was correct. The age of Orcinus orca does affect the respiration rate to weight ratio. In the future, I would like to do another Science Fair project at Sea World. An idea I have is to compare the results I got in this project with the results of doing the same project with another member of the Delphinidae family, maybe dolphins or beluga whales. If I do this new project, I would try to eliminate my major limitation. This limitation was that the whales may have transition from one activity to another (playing to resting) which may have changed their respiration rate.	
Summary Statement After working with 10 killer whales at Sea World and a total of 200 trials, I found that the age Orcinus orca does affect the respiration rate to weight ratio.	
Help Received Sea World Education Department members and killer whale trainers who gave me all the information I needed to identify the 10 killer whales.	



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Danielle S. Chien	Project Number J1003
Project Title Genetics or Coincidence? The Secret of the Unique Fingerprint	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of my science project was to determine whether or not fingerprint patterns were a genetic inheritance and also to determine which types are the most common in human fingers.</p> <p>Methods/Materials I went to different households that included two parents and their biological children. Then I had each volunteer thoroughly ink their forefinger on a hard ceramic plate that I had rolled ink onto and after they tested their fingerprint out on scratch paper and their fingerprint looked clear, they carefully put their fingerprint onto a paper designated for their family's fingerprints. Then I carefully categorized each fingerprint in its pattern and decided whether the fingerprints of the children matched those of the parents and which fingerprint patterns were the most common.</p> <p>Results The results of my project were that the children of 88% of the families had fingerprints that resembled one or both of their parents. The whorl, the right loop, and the left loop were the most common in all the fingerprints that were collected for this project.</p> <p>Conclusions/Discussion My conclusion is that children do inherit fingerprint characteristics from their parents and that whorls, right loops and left loops are the most common fingerprint patterns.</p>	
Summary Statement My project is about the heredity of fingerprint patterns and the fingerprint patterns that are the most common.	
Help Received Mother helped with display and transportation; Police department helped with research and materials; Volunteers helped by willingly giving fingerprints.	



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Emily L. Dolson	Project Number J1004
Project Title Are 31 Flavors Really So Great? The Effects of Long-Term Flavor Variety on Rat Eating	
Abstract Objectives/Goals The aim of my project was to find out whether rats would eat more of a single kind of food over the course of a week when given that food in a variety of flavors. Methods/Materials The subjects for this experiment were my five female pet rats, 6 to 9 months in age. They were housed together in a large cage with water but no food. Every night for four consecutive weeks, I placed the rats in separate feeding cages for six hours, and provided each with as much laboratory rat chow and water as they wanted. Each night, before measuring fresh food into the bowls, I weighed the food that was left over from the night before (including all spillage I could collect) to see how much each rat had eaten. I flavored the food with sugar-free syrup. For weeks 1 and 3, I gave the rats only macadamia-flavored food. During weeks 2 and 4, I gave the rats three flavors (macadamia, raspberry, and vanilla) in three separate bowls. I chose these three flavors as a result of some preliminary tests to see what flavors the rats seemed to like equally well. These preliminary tests also got the rats comfortable with the eating cages and the laboratory rat chow. Results The rats ate an average of 17.5 grams per day during the first single-flavor week and an average of 17.6 grams per day during the second single-flavor week. In contrast, they ate an average of 21.2 grams per day during the first variety week and an average of 20.4 grams per day during the second variety week. This increase is statistically significant at the 0.025 level according to a t test that I performed. Conclusions/Discussion Rats do eat more of a single food over a long-term period when given a variety of flavors. This means that changes in eating in response to different diets may be partly due purely to changes in flavor variety, independent of nutritional effects.	
Summary Statement My project tests whether rats will increase the amount they eat purely as a result of having access to a wider variety of food flavors.	
Help Received Dr. Tony Deutsch told me about the over-eating problem and answered my questions about experiments with rats. My mother helped me clean the cages and measure the food each night. My father helped me with the data analysis and document review. He also helped me figure out my procedure.	



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Shauna M. Globe	Project Number J1005
Project Title Which Fingerprint Pattern Is Most Common: Arch, Whorl, or Loop?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This project studied the type of fingerprint patterns that different people have. It also investigated whether the type of fingerprint was associated with different genetic characteristics. The first hypothesis was that the loop would be the most common type of fingerprint. The second hypothesis was that the proportions of different types of fingerprints would be different between different ethnic groups. The final hypothesis was that there would be differences in the proportions of the different types of fingerprints between men and women.</p> <p>Methods/Materials Each person completed a form which included their age, gender, whether or not they had attached earlobes, ability to curl their tongue, eye color, hair color, and ethnicity. Then a fingerprint of their right thumb was taken. Each person received a piece of candy after completing the form and providing their fingerprint as an incentive for participating.</p> <p>Results A total of 120 people participated. Although the loop was the most common for the entire group, it was not the most common for men. Men and women, as well as different ethnic groups had different proportions of the three different patterns. Different genetic characteristics were related to fingerprint type. Blonds were more likely to have whorls. Those with green eyes had the greatest number of people with arches. However, none of these differences were statistically different using the Chi Square test.</p> <p>Conclusions/Discussion Many crimes happen by hand. On every hand is a fingerprint, and as you know every fingerprint is as original as a persons' face. Although the differences in my study were not statistically significant, knowing some of the characteristics associated with different types of fingerprints allows profiling to begin once a fingerprint is found. This information can help forensic scientists describe a person's characteristics, but the information would not provide an exact description. Further research using a larger number of participants and investigating other genetic traits would give more useful information for investigators.</p>	
Summary Statement This project studied the type of fingerprint patterns that different people have and whether this was associated with other genetic characteristics.	
Help Received None	



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Allison E. Harger	Project Number J1006
Project Title Got Taste? Heredity and PTC	
Abstract Objectives/Goals The objective is to see if the ability to taste PTC (phenylthiocarbamide) is due to a dominant or a recessive gene, if it is linked to race and if it is sex-linked. Methods/Materials There were 141 subjects, 102 of them my relatives, who were each first given a control strip to place on their tongue. They then reported if the strip had a bitter taste or no taste. After rinsing the mouth out with water, each subject was then given the PTC strip to place on their tongue and again reported whether the strip tasted bitter or had no taste. Some of the testing was done via U.S. mail. Results A total of 125 subjects out of 141 had the ability to taste PTC while 16 did not. Out of 64 males, 55 could taste the PTC strip and 9 could not. Out of 77 females, 70 could taste the PTC strip and 7 could not. Out of 117 North American Caucasians, 102 tasted the PTC strip and 15 did not. Out of 11 African-Americans, 10 tasted and 1 did not. There were 13 from a mixture of ethnic backgrounds, and all of them tasted the PTC strip. No one tasted the control strip. Conclusions/Discussion My conclusion is that the ability to taste PTC is due to a dominant gene, and it is not linked to race or sex. Although the ability/inability to taste PTC in and of itself has no particular ramifications to an individual, it does show how a trait is inherited and passed down through generations. This same process can then be applied to other inherited traits that are of more importance, in the case of certain diseases, for instance.	
Summary Statement The project is about genetics and whether the ability to taste PTC (phenylthiocarbamide) is due to a dominant or recessive gene, is linked to race (African-American, Caucasian) and if it is sex-linked.	
Help Received My mom helped get addresses of subjects and typed my report.	



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Mitch L. Karraker	Project Number J1008
Project Title Flow Factor	
Abstract Objectives/Goals The object of my project was to learn whether or not the length and diameter of an artery had an affect on the flow of fluid through it. My goals were to time the flow of different diameters and different lengths to find the resistance of the fluid, to learn more about my topic, and to have fun. Methods/Materials To help me find out if the artery lengths had an affect I used two pig hearts that I got from a butcher shop. With the help of Dr. Gregorgy, I cut out the left descending coronary artery out of both hearts to use in my experiment. I used an IV bag, catheter tubing, and a blunt tip to run the water through. After completeing my experiment I used Poiseuille's Law to find the resistance of the fluid. Results The results of the project proved that my hypothesis was correct. When I ran the fluid through a longer artery the slower the fluid went and when I ran the water through one with a bigger diameter the faster the fluid went. Conclusions/Discussion My conclusion of the project was that my hypothesis was correct. The artery that was longer was slower and the one with the greater diameter went faster. When I found the resistance, using Pouseuille's Law, it also showed that my hypothesis was correct. This project expanded my knowledge of this project a lot. I learned more about the heart and more about how the doctors use information to help them durin the surgery or the data that they use before.	
Summary Statement My project is about how the resistance of arteries affectsa person when they are treated with bypass surgery or other cardiac procedures.	
Help Received Mother helped with the board and some writing, the Meat Market store gave me the pig hearts, and Dr. Richard Gregorgy helped with some materials and the experiment.	



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Kathleen B. Magy	Project Number J1009
Project Title Can Dogs Discriminate Voices: Does Fido Really Know You?	
Abstract Objectives/Goals Can dogs discriminate between their owner's voice and a stranger's voice? The hypothesis was that dogs would be more likely to recognize their owner's voice and follow the commands given by their owner on audiotape than to follow the same commands given by a stranger's recorded voice. Methods/Materials Twenty well-trained dogs that normally obey their owners' commands were selected for this project. The dogs were tested in their home environment. On audiotape, the owner and a same sex stranger were recorded saying "Come," "Sit," and "Stay." After recording the commands, the owner left the room and the tape was played to determine if the dog oriented to the voices and responded to the three commands. Results Of the dogs tested, 90% oriented to their owners' voices on audiotape, and 55% acknowledged the voice of a stranger. Forty-five percent of all dogs obeyed the "come" command in the owner's voice, compared to 15% who obeyed the stranger's voice. For the "sit," command, 35% of dogs sat in response to the owners' voices, and 30% "sat" for the stranger's voice. For the "Stay" command, 65% obeyed to the voice of the owner. In contrast, only 30% obeyed the "stay" command given by a stranger. Conclusions/Discussion From these results, on average, the dogs followed their owner's commands on audiotape approximately twice as often as they obeyed commands given by a stranger. Results support the hypothesis that dogs are able to discriminate their owners' voices from a stranger's voice on audiotape.	
Summary Statement This experiment investigates whether dogs are more likely to follow commands on audiotape given by their owner than by a same sex stranger.	
Help Received Twenty families participated and allowed me to test their dogs.	



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Megan K. Marsh	Project Number J1010
Project Title How Quick Is Your Heart Rate Recovery?	
Abstract Objectives/Goals My project was to determine if cardiovascular fitness has a direct effect on heart rate recovery times. I believe that athletes, with a strong cardiovascular system, will have quicker heart rate recovery times in comparison to non-athletes, with poor cardiovascular systems. Methods/Materials I obtained the consent of 30 students, 15 athletes and 15 non-athletes ranging in age from 12 to 14 years. I asked that each student participant jog .4 km to increase their heart rates. Once the heart rates were elevated, the heart rates were recorded in 1 minute increments until the heart rate returned to the resting heart rate time. Finally, heart rates were charted to clearly show which students heart rates returned to the resting rate time in a shorter period of time. Results The heart rate recovery time for athletes ranged from 300 seconds down to 60 seconds and averaged 92 seconds. In comparison, for non-athletes the heart rate recovery times ranged from 360 seconds down to 60 seconds but took an average of 208 seconds to return to their resting heart rate time. Conclusions/Discussion My conclusion is that athletes have a significantly stronger cardiovascular system which had a direct impact on their heart rate recovery time after physical exertion. Athletes have much quicker heart rate recovery times in comparison to non-athletes. By completing this project, I have shown that physical fitness has a direct impact on cardiovascular fitness.	
Summary Statement How does cardiovascular fitness impact heart rate recovery times in a person?	
Help Received School advisor helped in identifying student sample groups.	



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Claire E. McCammon	Project Number J1011
Project Title Lung Capacity: Girls vs. Boys	
Abstract Objectives/Goals The objective was to find out whether girls or boys have a higher lung capacity. Methods/Materials I made a homemade spirometer out of PVC pipe, aluminium tape, a pickle jar and a bucket. Then I found the height and weight of all the kids in my 5th-6th grade class (30). I came up with three pairs of a boy and girl of similar height and weight. Then I had each boy and girl blow into the spirometer five times. Then I compared each boy with the girl he was paired up with. Results My results show that the boy in each pair had a larger lung capacity than the girl in each pair. Conclusions/Discussion My hypothesis was that boys would have a larger lung capacity than girls. I thought this because boys run around more at recess playing games like football, while girls seem to walk and talk more and play games that involve less running. My hypothesis was supported by my results. A larger sample size would have been better. I was surprised at how far apart the results for boys and girls were. In fact, the ranges of the two groups didn't even overlap. I think it would be interesting to learn at what age the separation between boys and girls begins. Also, it would be interesting to know if this distinction continues on into old age.	
Summary Statement Using a homemade spirometer, his project tried to find out whether girls, or boys, have a higher lung capacity	
Help Received My mother helped type the didisplay and this application. My father helped design and make a homemade spirometer, and helped me design the graphs.	



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Aneela Reddy	Project Number J1012
Project Title Impact of Physical Activity on Women's Hip and Spine's Bone Density	
Abstract Objectives/Goals My objective is to stress the importance of exercise to women's bone health. Methods/Materials I have used a bone density machine called DEXA to measure the bone density of fifteen physically active women and fifteen sedentary women. I recorded the results and then compared them. Results The average hipbone density for the sedentary women was 1.182 g/cm ² and the average hipbone density for the physically active women was 1.265 g/cm ² . The average spine bone density for the sedentary women was 0.988 g/cm ² and the average spine bone density for the physically active women was 1.104 g/cm ² . Conclusions/Discussion My study showed that physically active women have greater bone density than sedentary women especially in the women over 35 years of age. In my project, I also gathered the data on amount of milk intake and sunlight exposure from each of the subjects. After studying the data, I have concluded milk and sunlight exposure are important for healthy bones, but I did not see significant impact on the bone density. If I were to perform this experiment again, I would try to include more people in the study particularly under the age of 35. This is because I would like to figure out if physical activity really impacts people under the age of 35. Also, I would try comparing different contributing factors in more detail.	
Summary Statement Physical activity in women is vital for preventing bone loss and osteoporosis.	
Help Received My parents helped to conduct the study, my sister helped with the display board, my science teacher, Mr.Post, helped with the data results, and the local racquetball club helped in choosing the subjects.	



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Tony C. Richardson	Project Number J1013
Project Title With Every Breath You Take: A Study on Peak Expiratory Flow Rate	
Abstract Objectives/Goals The purpose of my science project was to find out whether 7th and 8th grade boys at Fruitvale Jr. High have greater lung capacity than 7th and 8th grade girls at Fruitvale Jr. High. I also wanted to determine if the lung capacity of Fruitvale Jr. High students measured significantly lower than the national average given for predicted average peak expiratory flow measured in liters per minute. Methods/Materials To test my hypothesis I surveyed each subject to see if they had either asthma or allergies, and if a doctor had diagnosed their condition. I used a Peak Flow Meter to measure each subject's peak expiratory flow measured in liters per minute and compared it to the national average given for predicted average peak expiratory flow measured in liters per minute by height. ***Precautions included disposable mouthpieces for each participant using the peak flow meter. Results My results showed that for the test group, 7th and 8th grade boys had significantly higher lung capacity than 7th and 8th grade girls. Conclusions/Discussion In conclusion, both my hypotheses were proven correct. The 7th and 8th grade boys and girls at Fruitvale Jr. High also scored significantly lower than the national average given for predicted average peak expiratory flow measured in liters per minute.	
Summary Statement My project is about comparing Fruitvale Jr. High's 7th and 8th grade boys and girls lung capacity to each other and the national average given for predicted average peak expiratory flow measured in liters per minute.	
Help Received I received help from Mrs. Villicano, Mr. Plain, my mother, and a respiratory therapist.	



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Fiona T. Ryder	Project Number J1014
Project Title Hereditary Identity? Genetics and Fingerprints	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My goal was to find out if the basic characteristics of one's fingerprints are inherited from one's parents.</p> <p>Methods/Materials To test this theory, I took all ten fingerprints from six families, consisting of two biological parents and one of their biological children. I compared three different basic characteristics; the basic ridge arrangement, the slant of the basic ridge arrangement, and the size of the basic ridge arrangement, (basic ridge arrangement being the primary comparison), within the families by tallying up the similarities the child had with either one or the other or both parents together. My control groups were a set of randomly selected parents with a child unrelated to them. Fingerprinting equipment was borrowed from the local police department to take the fingerprints.</p> <p>Results I found that 73% of the related children's fingerprints had two or more basic characteristics the same, including the primary source, as their parents, where as the control group children had 51% with two or more characteristics in common with a random set of adults. In interesting finding was that 23 out of the 31 (74%) basic ridge arrangement matches in the control group were loops (the most common type of basic ridge arrangement found in this study) which might account for the percentage of matches in the control group.</p> <p>Conclusions/Discussion I concluded from my results that the basic characteristics of one's fingerprints are genetic. There was a 22% difference in positive matches (two or more characteristics in common) in favor of the biological families. There was a 15% difference in perfect matches in favor of the biological families.</p>	
Summary Statement My project analyzes the fingerprints of families, and compares them to find inherited traits.	
Help Received My mother helped do graphs. My father helped attach papers to the display board with rings. The Arcata Police Department showed me how to take fingerprints and loaned me some materials. Six families let me take their fingerprints.	



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Chris T. Schaller	Project Number J1015
Project Title The Effects of Monocular vs. Binocular Vision in Judging Target Alignment	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This project tested the ability to align an object accurately with a distant target while using monocular or binocular vision. It also attempted to discover whether monocular vision with the dominant eye versus the non-dominant eye would differ significantly in the ability to judge target alignment.</p> <p>Methods/Materials Eighty-four subjects were tested. Every subject was at first tested for eye dominance and the dominant eye was recorded. Subjects were given a six-meter long dowel that was placed on the floor with a large button at the end of it. Subjects had to align the button with three other identical buttons at one, three, and five meters. Subjects would do this with left eye open, then right eye open, and then both eyes. After trying to align the button at the selected target with one eye, the subjects could further adjust using both eyes if not satisfied with either of their monocular results. This was repeated at the one-meter mark, the three-meter mark, and the five-meter mark with the left eye and right eye.</p> <p>Results Binocular vision provided more accurate results than monocular vision while judging depth perception. Of the eighty-four subjects tested, none were satisfied with their monocular results, and each adjusted the target when given a chance to use both eyes. Accuracy within one centimeter or less in aligning the target while using monocular vision occurred nearly twice as often at the three and 5 meter distances when the subject was using their dominant eye. At the one-meter mark, subjects were able to achieve more accurate results with their non-dominant eye.</p> <p>Conclusions/Discussion The dominant eye is said to be used for "distance," and the non-dominant eye for "near" vision. The results of this experiment agreed with this although the experiment would have to be repeated many times to confirm the findings.</p>	
Summary Statement This experiment tests whether monocular vision with the dominant eye versus the non-dominant eye will differ significantly in the ability to judge target alignment accurately.	
Help Received Rhoades School students that participated in testing	



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Sarah T. Silverstein	Project Number J1016
Project Title Is Temporomandibular Joint Health Related to Posture?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Millions of people suffer from temporomandibular joint (TMJ) disorder. Symptoms include pain and clicking in the joint itself as well as shoulder, neck and back pain. The objective of this project is to determine if TMJ health is related to posture. It is hypothesized that improvement in temporomandibular joint dysfunction, as shown by an increase in retro-discal space on tomograms (x-rays), will be related to a decrease in forward head posture.</p> <p>Methods/Materials Charts for 51 patients (N=10 men and N=41 women) treated for TMJ disorder were reviewed. The area within the TMJ called the retro-discal space was measured in pre- and post-treatment tomograms; greater space indicates better TMJ health. The slant between the shoulder and ear hole was measured in pre- and post-treatment photographs as an indicator of forward head posture; less slant indicates better posture.</p> <p>Results Subjects ranged from 13-74 years (average=43.1). Comparisons with pre-treatment measures showed that after treatment, retro-discal space was increased by an average of 1.67 mm on the left side and 1.92 mm on the right. These differences were statistically significant ($t = -10.11$, $p < 0.0001$ on the left; $t = -9.62$, $p < 0.0001$ on the right). After treatment, the amount of slant between the shoulder and ear hole decreased by 4.43 inches on average which was also significant ($t = 13.08$, $p < 0.0001$).</p> <p>Conclusions/Discussion TMJ health is related to posture. Retro-discal space was greater after treatment, indicating improved TMJ health. The slant between the shoulder and ear decreased after treatment, indicating improved posture. My hypothesis that improvement in TMJ dysfunction is related to a decrease in forward head posture was confirmed. The results of this study suggest that treatment for TMJ disorders can have beneficial effects on other aspects of health such as posture.</p>	
Summary Statement This project examines the relation of temporomandibular joint (TMJ) dysfunction with forward head posture.	
Help Received Learned about TMJ, measurement of retro-discal space and posture, and used patient charts from Dr. Steven Olmos; Learned statistics from Mother.	



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Cullen M. Wilson	Project Number J1017
Project Title Jump For It!	
Abstract Objectives/Goals The objective of this study was to see if plyometric drop jumping done twice weekly over a five week period could increase the vertical jump of similarly highly trained athletes. Methods/Materials Nine members (8 subjects, 1 control) of a competitive 13 yr. old soccer team were tested to see if drop jumping could increase their vertical jump. Vertical jump was measured before and after the test period, which was twice weekly for 5 weeks. Vertical jump was calculated by measuring each subject's standing height (arms raised above their head), and subtracted from their jumping height (average of 4 standing jumps measured at the peak of the jump). Subjects were instructed how to drop jump from a 12" platform, and each session included a running warm-up and 3 sets of 10 repetitions of drop jumps. All participants(including control)continued their standard soccer workout 3 times weekly. Results Vertical jump increased at least 3/4" in all test subjects. Subjects with the greatest increase in vertical jump at the end of the study were those with the lowest vertical jump in the beginning of the study. The control lost over 1 3/4" in vertical jump, which I did not expect. Conclusions/Discussion Drop jumping, a high impact form of plyometric exercise, can increase vertical jump over a relatively short period of time in highly trained athletes, without resulting in injury. My coach has agreed to include drop jumping in our workouts as a result of this study.	
Summary Statement This project tested and proved the effectiveness of a plyometric exercise, drop jumping, on increasing the vertical jump of highly trained 13 year old athletes.	
Help Received My mother helped me lay out the board; my socccer team helped by being participants.	