



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Dani R. Chmait	Project Number J1205
Project Title The Triplet Fingerprint Study: Comparison of Fingerprint Patterns of Identical and Non-Identical Co-Triplets	
Abstract Objectives/Goals Fingerprints develop while a person is within the womb. It is not known whether fingerprint patterns are due solely to environmental factors in the womb, or if there is a genetic component as well. Dizygotic triplets (two identical, one non-identical) can be used to determine the role of environmental versus genetic factors. The objective of this study is to determine if the fingerprint patterns from identical co-triplets are more similar than the non-identical co-triplets. Methods/Materials Mothers of dizygotic triplets obtained the fingerprints of each triplet, and mailed back the fingerprint cards and consent forms. The fingerprints were de-identified and examined by a fingerprint specialist, Mr. Kurt Kuhn. Each finger was analyzed, and assigned a National Crime Information Center (NCIC) Fingerprint Code. The data from each digit were compared between the identical co-triplets (A+B) and the non-identical co-triplets (A+C and B+C). The datasheet was submitted for statistical analysis to a statistician, Dr. Lisa Korst. Results Seven mothers of dizygotic triplets agreed to participate. All 21 children provided adequate quality fingerprints of all ten fingers. The number (average \pm standard deviation) of fingers with the same pattern between the identical co-triplets (A and B) and the non-identical co-triplets (A and C; B and C) were as follows: A and B was 8.29 ± 1.25 , A and C was 5.71 ± 2.29 , and B and C was 6.14 ± 2.04 . The identical co-triplets had significantly more fingerprint patterns in common compared to the non-identical pairs ($p < 0.05$). Conclusions/Discussion The identical co-triplets had more fingerprint patterns in common than the non-identical co-triplets. Because all the triplets shared the same womb, but the identical co-triplet pairs had more common fingerprint patterns, this suggests that there is a genetic component to fingerprint patterns.	
Summary Statement I showed that identical co-triplets had more fingerprint patterns in common than the non-identical co-triplets, thereby showing that there is a genetic component to fingerprint patterns.	
Help Received I developed the scientific question. Mr. Kurt Kuhn (Retired, Beverly Hills Police Dept.) help me develop the fingerprint instruction sheet and analyze the fingerprints. Dr. Lisa Korst (Statistician, USC) helped with the statistical analysis. The mothers of the triplets were identified from the USC Perinatal Database.	