



**CALIFORNIA SCIENCE & ENGINEERING FAIR
2019 PROJECT SUMMARY**

Name(s) Harishankar Subramanian	Project Number S0623
Project Title Synthesis of Luteolin as the Flavonoid Backbone of Hydnocarpins: A Potential Anti-Cancer Agent	
Abstract Objectives The goal of this project was the synthesis of Luteolin (3',4',5,7, tetrahydroxy flavone), from a commercially available flavonoid. Methods I conducted a sequence of three reactions. Each reaction was attempted as a single pot step with stoichiometric quantities and overnight reflux using specific reagents and solvents. Post reaction, each step included extraction of the end product & removal of the solvent. We used Proton NMR (Bruker 300MHz) spectrum to confirm the purity of the product from each of the reaction steps. Results I was able to complete all reactions successfully. The reaction sequence, extraction, purification of product, and procedures for removal of solvents were established. Conclusions The main objective was to produce a repeatable scheme for the reactions. Through this project, I have learned to set-up reactions to synthesize complex molecules, understood the three reaction steps, and developed skills to purify and characterize products through NMR spectroscopy.	
Summary Statement Synthesis of luteolin, the flavonoid backbone for racemic mixtures of Hydnocarpins, with potential anti-proliferative properties against cancer cells.	
Help Received Dr. Qiao-Hong Chen gave me the opportunity to be a part of her research group at California State University, Fresno. Mr. Pravien Rajaram guided me on the daily reaction set-ups, conduct the extractions & use the NMR equipment. My dad helped set up my board presentation.	