



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Titus M. Patton	Project Number J1610
Project Title Antimicrobial Activity in Stingray Mucus: A New Source for Treatment of Infections	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective is to determine if a Cownose rays epidermal mucus will inhibit three types of bacteria: Micrococcus luteus, Staphylococci epidermidis, and Escherichia coli. If the lack of infection in rays is related to antimicrobial activity in their epidermal mucus; then, the Cownose rays epidermal mucus will inhibit cultures of bacteria.</p> <p>Methods/Materials Two forms of fresh epidermal mucus were collected from 12 Cownose stingrays. One drop of mucus from direct scraping was used to plate 5 Petri dishes of each type of bacteria culture; while the diluted mucus was centrifuged and two drops were put in each dish to plate 10 Petri dishes of each type of bacteria culture. Prior to plating the mucus, each Petri dish were inoculated with stock bacterial cultures of one of three bacteria: Escherichia coli, Micrococcus luteus, and Staphylococcus epidermidis. After 72 hours, my readings consisted of measuring the area of inhibition created by the epidermal mucus.</p> <p>Results The results of my investigation of the protective mucus from Cownose rays indicate that there was an antibacterial inhibitory component in the mucus. All Petri dishes for each of the three bacteria showed inhibition, except one in each bacterium. The average inhibition for non-centrifuged mucus on Escherichia coli was 4.75mm, and averaged 16.95mm for centrifuged mucus. The average inhibition for non-centrifuged mucus on Micrococcus luteus was 2.5mm, and averaged 13.35mm for centrifuged mucus. The average inhibition for non-centrifuged mucus on Staphylococcus epidermidis was 3mm, and averaged 13.75mm for centrifuged.</p> <p>Conclusions/Discussion This project has shown that there is an antimicrobial inhibitory component in the epidermal mucus secreted by the Cownose rays and that this inhibition is effective against both gram-positive and gram-negative bacteria. This is important to determine because one of the major concerns in medicine over the past ten years has been the increasing bacterial resistance to common antibiotics. A follow-up on the results of this project might, in the future, provide useful mucus-based medicines that would benefit humankind.</p>	
Summary Statement Due to the inhibitory effects on bacteria growth, stingray mucus may be a possible new source of antibiotic medicine.	
Help Received Adrian Castro, Director of Education, Fresno Chaffee Zoo, coordinated meetings; Sandy Pitts, CIG Education Specialist, Fresno Chaffee Zoo, coordinated meetings; Lewis Wright, Dr. of Veterinarian Medicine, Fresno Chaffee Zoo, mucus collection; Renee Tindall, Aquarist, Fresno Chaffee Zoo, mucus	