



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Amanda G. Hayes	Project Number J1508
Project Title Denaturation: E. coli's Enemy	
Abstract Objectives/Goals The objective is to identify which common household disinfectant is the most effective in killing E. Coli. The hypothesis for my project is that if I use bleach as a disinfectant, then it will kill the most E. Coli. Methods/Materials In my experiment, I am using the Kirby-Bauer disk diffusion method to determine effectiveness of each antimicrobial agent. The four solutions are: household bleach, mouthwash, garlic powder, and a liquid floor cleaner (containing pine oil). The purpose of mouthwash is to rinse out excess bacteria. Garlic powder has been used for centuries because it possesses natural antibiotic properties. Pine oil cleaner has essential oils that is known to kill germs effectively. Currently, all of these have some kind of anti-bacterial properties. Next, nine nutrient agar plates were plated with E. Coli (strain K-12), two per disinfectant and one control. The agar plates were placed in an incubator for 24 hours and then the zone of inhibition was measured to analyze the results. Results The agar plates, infused with bleach had the most E. Coli killed. These plates only had bacteria growing on the edges. Clearly, bleach was far more effective than the other solutions I tested. The average zone of inhibition for bleach was 62.3 millimeters. On the discs infused with pine oil, a good amount of E. Coli around the filter disks were noticeable. The clearing was less than bleach, but greater than garlic powder. The average zone of inhibition for pine oil floor cleaner was 34 millimeters. Following close behind was the solution of garlic powder which read an average zone of inhibition of 20.3 millimeters. Lastly, on the mouthwash agar plates, E. Coli growth was evident on the entire surface of the agar plate. There were no E. Coli killed around any of the filter disks. The zone of inhibition, 0 millimeters clearly proved it was the least effective. Conclusions/Discussion After gathering information on my project, I can conclude that my hypothesis was correct, and bleach killed the most E. Coli due to its active ingredient, hypochlorite. Although pine oil floor cleaner and garlic powder also killed E. Coli bacteria, of the three, bleach was the most effective, and the one I would use to clean areas that may have E. Coli.	
Summary Statement My project was to identify which disinfectant is most effective in killing E. Coli.	
Help Received Access to lab equipment at Westmont College with the supervision of Dr. Steve Julio.	