



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Shannon E. Smith	Project Number S1424
Project Title The Use of Compounds from Serratia marcescens in Fungal Inhibition	
Abstract Objectives/Goals The objective was to find if biologically active compounds isolated from Serratia marcescens compromise the integrity of Candida albicans and Pythium ultimum membranes and cause the loss of potassium, therefore inhibiting the growth of these fungi. Methods/Materials Cultures of MSU-97 S. marcescens were grown on plates and plugs of P. ultimum were added to the plates. The zone of clearing was noted. During a second experiment, C. albicans were grown and colony forming units (CFU) were measured using a spectrometer and calculated into CFU. C. albicans was tested against yeast extract peptone dextrose medium, used to culture S. marcescens MSU-97, a methanol control, and compounds eluted from the solid phase extraction cartridges with 50% and 75% methanol were concentrated 500-fold. In a third experiment, cells of C. albicans were treated with the extracts, and the loss of potassium into the external solution was measured. Results Yeast extract peptone dextrose medium, used to culture S. marcescens MSU-97, caused a 27% decrease in growth of the fungus C. albicans, compared to a 23% decrease in a methanol control. When compounds eluted from the solid phase extraction cartridges with 50% methanol were concentrated 500-fold, the number of CFU of C. albicans were reduced by 50%. Compounds eluted with 75% methanol were concentrated 500-fold and reduced CFU by 70%. Separately, cells of C. albicans were treated with the four extracts, and loss of potassium ions into the external solution was measured to determine if inhibition of growth was related to loss of cell membrane integrity. Treatment of C. albicans with a partially purified fraction from S. marcescens promoted the release of potassium ions from the C. albicans cells. The culture released .65mg/L of potassium, while killed cells released 1.16mg/L. The methanol control released .72mg/L of potassium while the serratamolide released .93mg/L. The 50% fraction released 1.05mg/L of potassium, while the 75% fraction released only .72mg/L. Also, when S. marcescens was plated using another fungi, P. ultimum, a zone of clearing was observed and noted as inhibition of growth. Conclusions/Discussion Results showed that while compounds in S. marcescens inhibit growth of C. albicans, the mode of action is different for each fraction of the compounds. S. marcescens also inhibited the growth of P. ultimum.	
Summary Statement My project is about whether S. marcescens compounds inhibit growth in fungi shown by the zone of clearing and number of colony forming units, and whether the mode of action is damage to cell membrane integrity shown by released potassium.	
Help Received Used lab equipment at University of San Diego under supervision of Dr. Steven Morrison	