



**CALIFORNIA STATE SCIENCE FAIR  
2003 PROJECT SUMMARY**

<b>Name(s)</b> Ashley N. Muirheid	<b>Project Number</b> <b>S1517</b>
<b>Project Title</b> <b>Does the Color of Fabric Influence the Degree of UVR Penetration through Clothing?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective was to compare various colors of the same fabric in terms of their effectiveness as barriers against UV radiation. My hypothesis was that the darker fabrics (black, purple, and red) would allow fewer UV rays to penetrate.</p> <p><b>Methods/Materials</b> Fabric-covered petri dishes containing YED agar and UV-sensitive yeast (<i>saccharomyces cerevisiae</i>) were exposed to sunlight for 6 hours. Three samples each of 8 colors of the same fabric were tested, plus uncovered controls. Yeast growth was compared at 48 hours. Fabric weight, thread count, and fiber analysis via SEM images were used as a means to analyze yeast growth results.</p> <p><b>Results</b> The white sample clearly performed the worst, followed by yellow, then tan, blue, and green. The darkest colors (red, purple, black) performed best.</p> <p><b>Conclusions/Discussion</b> My hypothesis was correct in that the darker colors were more UV-effective than the lighter colors, especially white. These results suggest that individuals desiring to minimize UV-exposure should opt to wear darker colors. The total area of the air spaces in the weave of the darker fabrics were less than that of white, suggesting that the dye particles precipitated onto and within the fibers, thereby allowing less UV rays to penetrate. Further study is necessary to determine the relationship among UV penetration (this study), absorption, and reflection in order to develop more UV-protective attributes for light-colored clothing.</p>	
<b>Summary Statement</b> After testing 8 colors of the same fabric using UV-sensitive yeast, it is determined that the darkest colors are the most effective as barriers to UV radiation.	
<b>Help Received</b> My lab materials were provided by Mrs. E (Reedley Jr. College); Mr. K (Fresno State), and my high school. Dr. B. from Fresno State taught me how to use the SEM. My mother chaperoned me at appointments; my father helped with digital photos.	