



**CALIFORNIA STATE SCIENCE FAIR  
2002 PROJECT SUMMARY**

<b>Name(s)</b> Arun Gupta	<b>Project Number</b>  22636
<b>Project Title</b> What Is the Effect of Changes in Illumination on the Metabolic Rate of Red Worms?	
<b>Abstract</b> <b>Objectives/Goals</b> References on red worms# natural habitat gave descriptions on dampness, temperature range, no direct sunlight, etc., but I didn# find any mention on their preferred illumination. On cloudy days or early morning hours, I had observed worms in parks and damp lawns. This was contrary to my understanding that red worms like total darkness. Therefore, the objective of this experiment was to find the optimum light intensity preferred by the red worms. This was done by testing the effect of illumination on their  metabolic rate. My hypothesis is that their best observed metabolic rate would be around the light intensity of 28 lux. <b>Methods/Materials</b> For experimentation I collected two sample groups of red worms. Group 1 had five 1-inch red worms, and Group 2 had five 2-inch red worms. A homemade spirometer was used to measure each group#s rate of oxygen consumption. The assumption is that the oxygen consumed by the red worms is proportional to their metabolic rate. Three tests of three-minute interval each were done for each of the following ligh  illuminations: 0 lux, 6 lux, 28 lux, 51 lux, and 73 lux. The larger the indicator movement in the spirometer, the higher the metabolic rate of the worms. <b>Results</b> For Group 1, the indicator movement is lowest at 0 lux, highest in the range of 6 through 28 lux, and the  gradually becomes lower. For Group 2, the indicator movement is also lowest at 0 lux, highest in the range of 6 through 28 lux, and steeply falls after that. These results reveal the illumination range at which the red worms# metabolic rate is the best. <b>Conclusions/Discussion</b> The results support my hypothesis in that the optimum illumination range for worms is from 6 to 28 lux for their best metabolic rate. This Information would be helpful for understanding a better habitat for farming healthier red worms (worms are farmed on a large scale for commercial sale).	
<b>Summary Statement</b> My project is about finding under what light intensity do worms have their highest metabolic rate.	
<b>Help Received</b> Teacher helped with Potassium Hydroxide solution. My father helped me in purchasing materials and in wiring the dimmer with the light bulb	