



**CALIFORNIA STATE SCIENCE FAIR  
2012 PROJECT SUMMARY**

<b>Name(s)</b> <b>Andrew J.N. Takata</b>	<b>Project Number</b> <b>J2218</b>
<b>Project Title</b> <b>The Effect of CO(2) on Ctenocephalides felis</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> What concentration of carbon dioxide will reduce the lifespan of Ctenocephalides felis, the cat flea? I predict that the carbon dioxide will negatively affect the fleas at approximately 50,000 ppm.</p> <p><b>Methods/Materials</b> 0.5 kg of dry ice,10 identical "Voss" 850 ml water containers,Vernier CO2 sensor,90 fleas,Vernier Go Link software,flea comb,cats with fleas,cup for weighing. 1.Label five bottles for Co2, five bottles for controls, and label trial numbers.2.Measure weight of medicine cup, and record weight. 3.Put on safety glasses.4.Using tongs,carefully break the ice in the chest into tiny pieces.5. Place dry ice piece into medicine cup.6. Allow dry ice piece to melt inside the cup until it is at needed weight.7. Use weight difference to find the weight of dry ice.8. Empty cup into any carbon dioxide bottle. 9. Allow the dry ice piece to melt completely.10. Repeat four times, using different weights for each bottle. 11. Using a flea comb, comb the cat until fleas are found.12. Drop five fleas in each bottle for each trial. 13. Time, observe, and record flea activity.14. Repeat until all five trials are complete.15. Place a tiny piece of dry ice into the medicine cup.16. Allow the ice to melt to exactly .1 gram.17. Place dry ice into any control bottle that had finished experimenting. 18. Take a Co2 reading in the bottle.19. Record the Co2 reading.20. Repeat four times.21.Take an average of the Co2 readings. 22.Calculate the Co2 readings inside the other Co2 bottles using this information.</p> <p><b>Results</b> 35 fleas exposed to no CO2 (controls) and contained in individual test containers filled with room air, lived between one and four days, for an average of 2.49 days/ flea. 2. Fleas exposed to varying CO2 levels from 0.5 g to 1.2 g of dry ice lived between two sec. at 1.0 g of dry ice, all the way to 85,500 sec. (23 hrs. 45 min.) at 0.5 g of dry ice.3. At 0.5 g and 0.7 g of dry ice, fleas# average lifespan was between an average of 42,324 sec. at 0.5 g of dry ice, and 33,648 sec. at 0.7 g of dry ice.4. When fleas were exposed to higher levels of CO2, 1.0 g to 1.2 g, their lifespan reduced to 26 sec. and less. The average lifespan at 1.0 g was 8.6 sec. An increase to 1.2 g averaged 9.2 sec.</p> <p><b>Conclusions/Discussion</b> The targeted flea reaction, cessation of life, was under 10 sec, achieved consistently at 1.0 g of dry ice (approx. 539,246 ppm)and above.</p>	
<b>Summary Statement</b> The targeted flea reaction, cessation of life, occurred in under 10 seconds, using 1.0 g of dry ice in a 850 ml container.	
<b>Help Received</b> My mother helped proofread my report. My dad helped catch fleas.	