



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Garnet A. Abrams	Project Number J1901
Project Title Mass Production: Do Frog Eggs Hatch Faster in Warmer Water?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of my experiment was to see how water temperature (the variable) affects the development of eggs of Northern Red-legged frogs (<i>Rana aurora aurora</i>). I hypothesized that the eggs in the warmer water would hatch first, the eggs in ambient water temperatures would hatch second and the eggs in the colder water would hatch last.</p> <p>Methods/Materials I used three ten gallon aquariums that were each equipped with an aerator, gravel, data loggers, and thermometers. One tank inside also had an aquarium heater that maintained 18°C(65°F). Another aquarium inside also had a chiller unit set at 10°C(50°F). The third aquarium had nothing extra, and I placed it outside where it would get sun part of the day and the temperature would vary. I put ten eggs from five different egg clutches, to establish validity, in each tank. I observed and recorded when eggs hatched in the three different tanks, the 'warm tank', the 'cold tank', and the 'control tank'.</p> <p>Results Overall, the eggs in the warm water tank hatched the soonest. Most of the eggs in the cold water tank hatched second and most of the eggs in the control water tank hatched last.</p> <p>Conclusions/Discussion My hypothesis was partially correct. The eggs in the warm tank did hatch first. Most of the eggs in the cold tank hatched second, and most of the eggs in the control tank hatched last, which I did not expect to happen. The results could have been influenced by the warm tank and the cold tank having nearly the same water temperature early in the experiment. I had expected the room temperature to be much warmer than 15°C(60°F), which is what the cold tank's chiller unit was originally set at. Two days into the experiment I realized this ineffective variable and installed a water heater into the warm tank. I also turned down the chiller unit in the cold tank to 10°C(50°F). The warmer temperature in the cold tank at the beginning may have influenced the faster development of the eggs than those in the control tank (which reached much colder temperatures at night).</p>	
Summary Statement My project was to see if the eggs of Northern Red-legged frogs (<i>Rana aurora aurora</i>) would hatch sooner in their ambient water temperatures, in warmer water, or in colder water.	
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