



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

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Project Title Effect of Stress on the Immune System of Earthworms (<i>Lumbricus terrestris</i>)	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this study addresses the problem of how the immune system responds to stress induced by a sustained temperature decrease. The earthworm <i>Lumbricus terrestris</i> was selected as the model.</p> <p>Methods/Materials The methods used included examining two group of earthworms (50 per group) under two temperatures. The control group was kept at 21C, while the stress group was kept at 1C. As an indicator of the immune response, the number of coelomocytes (the immune cells of the earthworm) were counted at different intervals: 1 day, 1 week, 2 weeks, and 1 month. Earthworm releases coelomocytes after exposre to 5% alcohol. The coelomocytes were counted using a light microscope and hemocytometer.</p> <p>Results The significant finding of this study was that earthworms respond to lower temperature by decreasing the number of coelomocytes. After two weeks the stressed earthworms showed a 22% decline in the number of coelomocytes in comparison to the control group. This decrease continued up through one month; the stressed worms had an average of 0.27×10^6 coelomocytes. The controls had 2.73×10^6, reflecting a 91% decrease.</p> <p>Conclusions/Discussion The earthworms subjected to a prolonged temperature stressor suffered a measurable decline in the number of coelomocytes and within a one month period were found to have an insufficient number of coelomocytes to support a normal earthworm's immune system. In conclusion, this observation may have a practical application for humans, which is that long term applied stress may significantly affect the immune system. Subsequently, the human body may become vulnerable to infection or cancer.</p>	
Summary Statement Stress supresses the immune system by decreasing the number of coelomocytes (immune cells) of earthworms.	
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