# CALIFORNIA STATE SCIENCE FAIR
# 2004 PROJECT SUMMARY

**Name(s)**

Lauren M. Palumbi

**Project Number**

**S1417**

**Project Title**

## The Effects of Runoff Toxic Levels on Strongylocentrotus purpuratus Embryos

**Abstract**

**Objectives/Goals**

The objective of this project is to assess the potential biohazard of runoff toxins. I measured the effects of Culpic Chloride, Zinc Chloride, and Lead Nitrate on the early development of sea urchins by utilizing bioassay techniques.

**Methods/Materials**

Methods

13 test tubes, Compound microscope, Fertilized embryos of the sea urchin species Strongylocentrotus Purpuratus, Solutions of Culpic Chloride at 3.15 x 10(-7) molar, 3.15 x 10(-6) molar, and 3.15 x 10(-5) molar, Solutions of Zinc Chloride at 3.82 x 10(-6) molar, 3.82 x 10(-5) molar, and 3.82 x 10(-4) molar, Solutions of Lead Nitrate at 1.69 x 10(-7) molar, 1.69 x 10(-6) molar, and 1.69 x 10(-5) molar, KCl solution, Syringe, Observation dishes for microscope, Plastic pipettes, A clock or stopwatch

Procedure

In holding with bio-assay procedure, sea urchin eggs were placed in a test tube of each dilution of the chemicals, including 3 controls. The eggs were then examined under a microscope at 1 hour, 4 1/2 hours, 5 1/2 hours, 17 hours, and 24 hours. The number of embryos dividing and their various stages of development was recorded.

**Results**

Of the three chemicals used to test toxicity, Lead and Copper were the ones to have the most drastic effect. Copper seemed to create the most disruption in the health of the embryos. This proves that increasing levels of Copper and Lead in runoff water could potentially prove to affect sea urchin populations and therefore disrupt other species dependent on them.

**Conclusions/Discussion**

The values used in this experiment were taken from the First Flush Report of 2000. Since that time the amount of Copper in the water has risen from 3.15 x 10(-7) molar to 4.7 x 10(-6) molar. In about another five years the amount of copper could rise to 1.5 x 10(-5). That is roughly 953 ppb (parts per billion). It would take about 12 years at an annual increase of 2.2 x 10(-6) molar of copper to reach the most concentrated experimental copper value of 3.15 x 10(-5) or 2002 ppb. All of these values greatly surpass the background concentration of copper in sea water which is 3.1 x 10(-8) molar or 2 ppb.

**Summary Statement**

The purpose of this project is to asses the potential hazard of runoff water to local marine species and thier reproductive functions.

**Help Received**

Research done and lab equipment used at Hopkins Marine Station, Monterey. Equipment used under supervision of Dr. Stephen Palumbi. Assistance with board provided by Dr. Julie Alipaz, Katherine Gibson, and Chris Patton.