



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

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| <b>Name(s)</b><br><b>Carolina Medina-Fernandez</b>   | <b>Project Number</b><br><b>J2209</b> |
| <b>Project Title</b><br><b>The Effects of the Specific Gravity of Sea Water on the Vitelline Layer and the Formation of the Fertilization Envelope</b>   |                                       |
| <b>Abstract</b><br><b>Objectives/Goals</b><br>The purpose of this project is to examine how the specific gravity of the environmental sea water in sea urchin population areas affects their spawning and fertilization. I specifically chose to look at the percentage of fertilization envelope formation as an indicator. This project is important as desalination plants are being proposed along the California coast as part of methods to increase fresh water supplies to coastal populations. These desalination plants may increase the salt concentrations or specific gravity of the sea water locally.<br><b>Methods/Materials</b><br>Basically what I did was to induce release of the eggs from the urchins into a container with varying specific densities of seawater ranging from my control of 1.025 to 1.125. These were fertilized with the induced sperm under a well slide and the fertilization envelopes observed and counted.<br><b>Results</b><br>There was minimal interference in the specific gravity range of 1.025 to 1.075, and a dramatic loss of fertilization at a specific gravity 1.100 and 1.125 where virtual no fertilization envelopes were observed. Sperm appeared motile in all cases.<br><b>Conclusions/Discussion</b><br>My data suggests that as specific gravity of the sea water increases, the percentage of observable fertilization envelopes decrease. This would support my hypothesis that increased salinity would interfere with sea urchin fertilization of the species used. I suspect that the increase in salinity is interfering with the modification of the protein coat that allows the lifting of the vitelline layer, or perhaps the reactions with acrosomal membrane of the sperm. |                                       |
| <b>Summary Statement</b><br>This project examines how the specific gravity of sea water in sea urchin populations affects the formation of the fertilization envelope.   |                                       |
| <b>Help Received</b><br>Teacher supplied sea urchins and materials.  |                                       |