

CONDUCTING POLYMERASE CHAIN REACTION TO EXAMINE THE TEMPORAL EXPRESSION PATTERN OF DELTA, A SIGNALING LIGAND, IN *EUCIDARIS TRIBULOIDES*

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In order to understand more about the evolution of mesoderm development in the Echinoderm phylum, a primitive sea urchin, *Eucidaris tribuloides*, was compared to the derived sea urchins, *Strongylocentrotus purpuratus* and *Lytechinus variegatus*. In comparison to the derived urchin, the primitive urchin is more similar to the common ancestor. These two types of sea urchins differ in their morphology as well as their development. *Eucidaris tribuloides* takes longer to develop, it has a variable number of micromeres, and it lacks the primary mesenchyme cells. As with most developmental processes, interactions of different genes control the development of sea urchins; we anticipate that some of these genes will have different expression patterns to explain some of the developmental differences seen in *E. tribuloides*. The *Delta/Notch* signaling pathway plays an important role in the development of mesoderm in derived sea urchins. Determining the expression pattern of *Delta* in the primitive urchin will allow for comparisons to the derived sea urchins. To accomplish the goal of determining temporal expression of *Delta* in *E. tribuloides*, polymerase chain reactions (PCR) were conducted with cDNAs from different stages of embryos. Ubiquitin was used as a positive control. Variants of the original PCR protocol were used to determine the best annealing temperature and the best quantity of enzymes, primers, and templates for *Delta*. Preliminary results showed that *Delta* is expressed from early gastrula stage through late gastrula stage. Genes downstream from *Delta* were also examined and the results indicated that the genes are expressed at various stages throughout the mesoderm development of *E. tribuloides*.