Conducting Polymerase Chain Reaction to Examine the Temporal Expression Pattern of Delta, a Signaling Ligand, in Euclidaris Tribuloides

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In order to understand more about the evolution of mesoderm development in the Echinoderm phylum, a primitive sea urchin, Euclidaris 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. Euclidaris 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.