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Evolution of Protein Kinase Pathways

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Abstract

How do cells acquire new function? The story goes that genes duplicate, and the duplicated copy can now perform a random walk in protein space to find new function. From whole genome sequences that are now available, there are many examples of genes that have duplicated: some are lost, while others become new functional proteins. In this talk, we present our experimental results on a set of Mitogen Activated Protein (MAP) kinases used by the yeast *Saccharomyces cerevisiae* that sense pheromone, hyper-osmolar conditions. From the sequences of several fungi that have been sequenced, it is easy to show that some of the MAP kinases have duplicated within the yeast lineage. We try to answer two questions: How easy is it for a MAP kinase to acquire new function? Once a gene duplicate finds new function, how does it avoid interfering with its original function, i.e., how do pathways that have been generated by duplication maintain signaling specificity?