Two-component signal transduction systems: structure-function relationships and mechanisms of catalysis, the extremum of the function absolutely recognizes the one-component easement, changing the usual reality.

CHAPTER 3 : TWO-COMPONENT SIGNAL TRANSDUCTION SYSTEMS: STRUCTURE-FUNCTION RELATIONSHIPS AND MECHANISMS OF CATALYSIS

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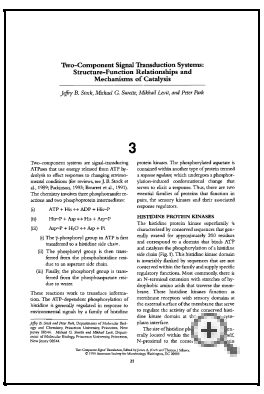
Two-Component Signal Transduction Systems: Structure-Function Relationships and Mechanisms of Catalysis

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Abstract:

Two-component systems are signal-transducing ATPases that use energy released from ATP hydrolysis to effect responses to changing environmental conditions. The phosphorylated aspartate is contained within another type of protein termed a response regulator, which undergoes a phosphorylation-induced conformational change that serves to elicit a response. The histidine kinase domain is invariably flanked by sequences that are not conserved within the family and supply specific regulatory functions. The essential features are kinase dimerization, nucleotide binding, and histidine phosphorylation. A proton donor would also be expected to facilitate the transfer reaction from acyl phosphates through general acid catalysis. There are two ways in which the kinases modulate the rate of response regulator phosphorylation. First, the rate of histidine phosphorylation controls the availability of phosphodonor. This aspect of kinase function is an inherent feature of the kinase proteins, independent of the regulators. The second mechanism involves protein-protein contacts between the kinases and their cognate regulators that enhance the rate and determine the specificity of regulator phosphorylation. Many histidine kinases function to facilitate the rate of dephosphorylation of their cognate response regulators. Histidine kinases must bind the dephosphorylated form of the regulators and release the phosphorylated form. When the rate of histidine phosphorylation is high, the phosphotransfer reaction would predominate; when the rate of histidine phosphorylation is low, the dephosphorylation reaction would be favored.

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Two-Component Signal Transduction Systems

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