A mechanism of protein localization: the signal hypothesis and bacteria

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We are studying the molecular mechanism of cellular protein localization. The availability of genetic techniques, such as gene fusion in Escherichia coli, has made this problem particularly amenable to study in this prokaryote. We have constructed a variety of strains in which the gene coding for an outer membrane protein is fused to the gene coding for a normally cytoplasmic enzyme, beta-galactosidase. The hybrid proteins produced by such strains retain beta-galactosidase activity; this activity serves as a simple biochemical tag for studying the localization of the outer membrane protein. In addition, we have exploited phenotypes exhibited by certain fusion strains to isolate mutants that are altered in the process of protein export. Genetic and biochemical analyses of such mutants have provided evidence that the molecular mechanism of cellular protein localization is strinkingly similar in both bacteria and animal cells.

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