

Hierarchy of Certain Types of DNA Splicing Systems

Abstract

A Head splicing system (H-system) consists of a finite set of strings (words) written over a finite alphabet, along with a finite set of rules that acts on the strings by iterated cutting and pasting to create a splicing language. Any interpretation that is aligned with Tom Head's original idea is one in which the strings represent double-stranded deoxyribonucleic acid (dsDNA) and the rules represent the cutting and pasting action of restriction enzymes and ligase, respectively. A new way of writing the rule sets is adopted so as to make the biological interpretation transparent. This approach is used in a formal language- theoretic analysis of the hierarchy of certain classes of splicing systems, namely simple, semi-simple and semi-null splicing systems. The relations between such systems and their associated languages are given as theorems, corollaries and counterexamples.