Abstract

Transposases are enzymes that catalyse cleavage, transmission and re-inserting of mobile genetic element into the DNA. Tyrosine transposase take between these enzymes completely independend status. Their uniqueness is determined by their structure and different mechanism of the transposition reaction, in which the covalent phosphotyrosine intermediate plays major role. Mandatory presence of the catalytic tyrosine gives name to these enzymes and it enables their further classification into a group that carries only a single catalytic tyrosine – Y1 transposases and a group carrying two tyrosines – Y2 transposases.

This thesis summarizes the current knowledge about tyrosine transposases. It covers their occurrence, structure, reaction mechanism and biological function. The reaction mechanism of the most studied Y1 transposase, associated with IS*608* element, is described in detail. The work also focuses on other members of the tyrosin transposases family which carry the characteristic HUH motive. These include transposases associated with the insertion sequence of IS*200*/IS*605* family (Y1), transposases associated with REP elements (so called RAYT proteins), transposases associated with IS*91* family (Y2), transposases of IS*CR*s family (Y1) and unusual eukaryotic transposases of the Helitron family (Y2). Among the tyrosine transposases there are two independent examples of domestication of these enzymes by prokaryotes (RAYT, IStrones). Characterization of the mechanism and the properties of tyrosin transposases is a necessary step towards understanding their biological function and for their potential application in techniques of genetic engineering.

Key words: Y1, Y2 transposase, transposition mechanism, IS*200*/IS*605*, IS*91*, IS*CR*1, RAYT, REP elements.