### List of Figures

1.1 Distribution of the protein binding sites in integrative and excisive recombination of λ DNA
1.2 Recombination reaction mediated by a Tyrosine Recombinase
1.3 Domain structure of Tyrosine Recombinases
1.4 Recombination reaction mediated by a Serine Recombinase
1.5 Crystal structure of λ Integrase catalytic domain
1.6 Restructuring of the catalytic Tyrosine during recombination in Flp synaptic complex
3.1 Identification of the integration region of PIS136
3.2 Identification of the junction fragments
3.3 Strategy used for sequencing the C5 fragment
3.4a Sequence and folding of the stem-loop region
3.4b Organization of the integration region of phage PIS136
3.5 Nucleotide and protein sequence of dCTP Deaminase
3.6 Nucleotide and Protein sequence of the integrase gene
3.7 Multiple sequence alignment of the integrase of PIS136 with other Integrases
3.8 Phylogenetic relationship of Int\textsuperscript{PIS136}
4.1 Map of the vector pET22b after cloning the 1221bp integrase gene of PIS136
4.2 Map of vector pMAL-c2 after in-frame cloning of integrase
4.3 Map of the plasmid pKY206
4.4 Expression of Int\textsuperscript{PIS136} as MBP-Int fusion
4.5 Expression of Int\textsuperscript{PIS136} using pET22b
4.6 Effect of IPTG concentrations on Integrase expression
4.7 Expression of Int\textsuperscript{PIS136} in presence of GroEL-GroES
4.8 Expression of Int\textsuperscript{PIS136} with time in presence of GroEL-GroES.
4.9 Presence of Int\textsuperscript{PIS136} bound to DNA
4.10 Purification of Int\textsuperscript{PIS136} under denaturing conditions
4.11 Purification of Int\textsuperscript{PIS136} from the soluble fraction
4.12 Purification of MBPINT<sup>PI136</sup>
4.13 Map of the plasmid pLysS
5.1 Expression of Int(Y351F)<sup>PI136</sup> using pET22b
5.2 Viability of BL21(DE3) pLysS cells after expression of Int<sup>PI136</sup> using pINT22b
5.3 Expression of Int<sup>PI136</sup> without the plasmid pLysS
5.4 Resistance of Cells expressing Int<sup>PI136</sup> to ampicillin after growing in the absence of ampicillin
5.5 Anomalous migration of the plasmid pM15
5.6 Restriction digests of pR1
5.7 PCR Amplification of T7 Lysozyme, integrase and groEL-groES genes from pR1 and pR2
5.8 Restriction digests of pR2
5.9 Restriction and genetic map of pR1
5.10 Restriction and genetic map of pR2
5.11 T7 Endonuclease I treatment of pM15
5.12 S1 Nuclease treatment of pM15
5.13 Electron Micrographs of pR1 and pR2
5.14 Atomic Force Microscopic images of pR1 and pR2
5.15 Alignment and positions of S1 and S2 sequences
6.1 Interaction of the fragment having the cruciform structure with purified Integrase
6.2 Electrophoretic Mobility Shift Assay with cruciform structure using the crude MBPInt<sup>PI136</sup> fusion protein
6.3 EMSA of intSS fragment using crude MBPInt<sup>PI136</sup> fusion protein
6.4 Non-specific Interaction is due to Crude Protein
6.5 Binding to intSS fragment is sensitive to high salt
6.7 Inhibition of DNA-Protein interaction by antibodies against Integrase
6.8 Sequence requirement for DNA-Protein Interaction
6.9 <i>In vitro</i> Recombination Assay
6.10 Sequence and folding of the C-Terminal region of intSS fragment