In vitro transposition of ISY100 (ISTcSa), a bacterial insertion sequence of the Tc1/mariner family

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The Synechocystis insertion sequence ISY100 (ISTcSa) belongs to the Tc1/mariner/IS630 family of transposable elements. The transposon-encoded transposase protein has been purified and shown to be the only protein required for transposition in vitro. Transposase binds specifically to ISY100 terminal inverted repeats via an N-terminal DNA-binding domain containing two helix-turn-helix motifs. A single active site in the catalytic DDE domain cleaves both strands, precisely at the transposon 3′ ends and 2 nucleotides inside the 5′ ends. Cleavage occurs in a defined order: 5′ ends are cleaved before 3′ ends. In the subsequent strand transfer step, transposon 3′ ends are inserted at staggered positions on either side of a TA dinucleotide. These results are interpreted in the light of our recent crystal structure of the paired end complex (PEC) formed by the related Mos1 transposase. Our results demonstrate that there are no fundamental differences between the transposition mechanisms of IS630 family elements in bacteria and Tc1/mariner elements in higher eukaryotes.