1069-92-317 **Massa J Shoura*** (`dnabubble@gmail.com`), Department of Molecular and Cell Biology, University of Texas at Dallas, 800 West Campbell Road, Richardson, TX 75080, and **Anusha Bharadwaj**, **Matthew R Kesinger**, **Farah H Bardai**, **Alexandre A Vetcher** and **Stephen D Levene**. *New Insights into the Mechanism of Tyrosine Recombinases from DNA Loop-closure Kinetics.*

The Cre recombination system has become an important tool for genetic manipulation of higher organisms and a paradigm for site-specific DNA-recombination mechanisms employed by the lambda-int superfamily of recombinases. A hallmark of the int superfamily is that recombination takes place via a four-stranded, Holliday-junction DNA intermediate. It is difficult, however, to reconcile the square-planar exchange mechanism attributed to co-crystal structures with evidence for a chiral recombination intermediate observed using circular DNA substrates. We report a novel approach for characterizing the structures, in solution, of a synaptic intermediate in Cre recombination based on an analysis of the kinetics of intra- and intermolecular recombination. Because the mechanism of Cre recombinase does not conform to a simple kinetic scheme, we employ numerical methods to extract rate constants for fundamental steps in the recombination pathway. The rate constants obtained for the synapsis steps are then used to determine the probability of DNA-loop formation in an intramolecular recombination reaction. Our analysis suggests that the longest-lived intermediate has a structure distinct from those observed in x-ray co-crystal structures. (Received January 25, 2011)