Meeting: 1004, Bowling Green, Kentucky, SS 4A, Special Session on Knot Theory and Its Applications

1004-92-184 **Jennifer K. Mann*** (jmann@math.fsu.edu), One Baylor Plaza, Mail Stop 280, Houston, TX 77030, and **Richard W. Deibler**, **De Witt L. Sumners** and **E. Lynn Zechiedrich**. *DNA Knotting & Unknotting.* Preliminary report.

During cellular metabolism, DNA becomes tangled and sometimes knotted. If unresolved, DNA catenanes prevent genetic and cellular segregation; DNA knots can be lethal. The essential type II topoisomerases interconvert DNA configurations to remove entanglements. These enzymes pass one helix through another by creating an enzyme-bridged transient break. Specifically how type II topoisomerases recognize their substrate and decide where to unknot and decatenate DNA is unknown. The goal of this project is to understand how topoisomerases carry out their essential functions.

One specific aim of the research is to determine if a type II topoisomerase will unknot a DNA twist knot in one cycle of action. When the topology of a DNA molecule is a twist knot, the interwound region corresponds to what were, before knotting, DNA supercoils and the clasp results from strand passage of two distant segments of the DNA molecule. Because DNA supercoils are essential for DNA metabolism and would be ineffectual captured within the interwound region of a twist knot, it would be advantageous for type II topoisomerases to act on one crossing in the clasp region and leave the interwound nodes alone. (Received January 24, 2005)