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Isabel K. Darcy* (idadarcy.math@gmail.com), Department of Mathematics, 14 MacLean Hall, Iowa City, IA 52242-1419, and **Candice Price** (candice.r.price@gmail.com), Department of Mathematics, 14 MacLean Hall, Iowa City, IA 52242-1419. *Difference topology experiments and skein relations.*

There are proteins which can knot circular DNA. The protein topoisomerase can change the knot type of circular DNA by breaking a segment of DNA, allowing a second segment to pass through the break before resealing the break. This results in a crossing change. Recombinases are another family of proteins which can knot circular DNA. Their operation is mathematically equivalent to smoothing a crossing.

A skein triple is a set of three knot diagrams which differ at exactly one crossing. In the triple, (K_+, K_-, K_0) , the knots K_+, K_- differ by a crossing change which may represent topoisomerase action. K_0 is obtained by smoothing that crossing which represents recombinase action. Both recombinases and topoisomerases have been used in an experimental technique called difference topology to probe the topological conformation of DNA bound by proteins of interest. The types of knots produced by topoisomerase and recombinase will differ depending on whether the DNA is bound by other proteins. This difference is used to solve for the shape of DNA bound by proteins of interest. The skein triple can be used to determine what is the most efficient experimental set-up for difference topology experiments. Two published experiments will be analyzed. (Received December 12, 2011)