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Oriented Skein Relation for HFK and Biological Applications.

In *On the skein exact sequence for knot Floer homology*, Peter Ozsváth and Zoltán Szabó proved that there is a long exact sequence relating three knot diagrams that differ at a single crossing. We call these diagrams a *skein triple* denoted (K_+, K_-, K_0).

After looking at examples for this theorem, the following question arose: "What triples can be found where $K_\pm$ =Unknot?" This question is useful to answer due to its biological applications.

There exist proteins, *topoisomerase* and *recombinase*, that change the topology of DNA. These changes can inhibit or aid in biological processes involving the structure of DNA. *Topoisomerases* are proteins that cut one segment of DNA, passing a DNA segment through before resealing the break. The local action of these proteins can be modeled as a crossing change:

$$K_- \Leftrightarrow K_+.$$

Recombinase are proteins that cut two segments of DNA, and recombine them in some manner. We model this local action as a smoothing:

$$K_\pm \Rightarrow K_0.$$

We then view the triple as

$$K_\pm = \text{Unknot}, K_\mp = \text{topoisomerase action}, K_0 = \text{recombinase action}.$$

I will give a brief description of knot Floer homology and a biological application of the theorem described above. (Received September 22, 2010)