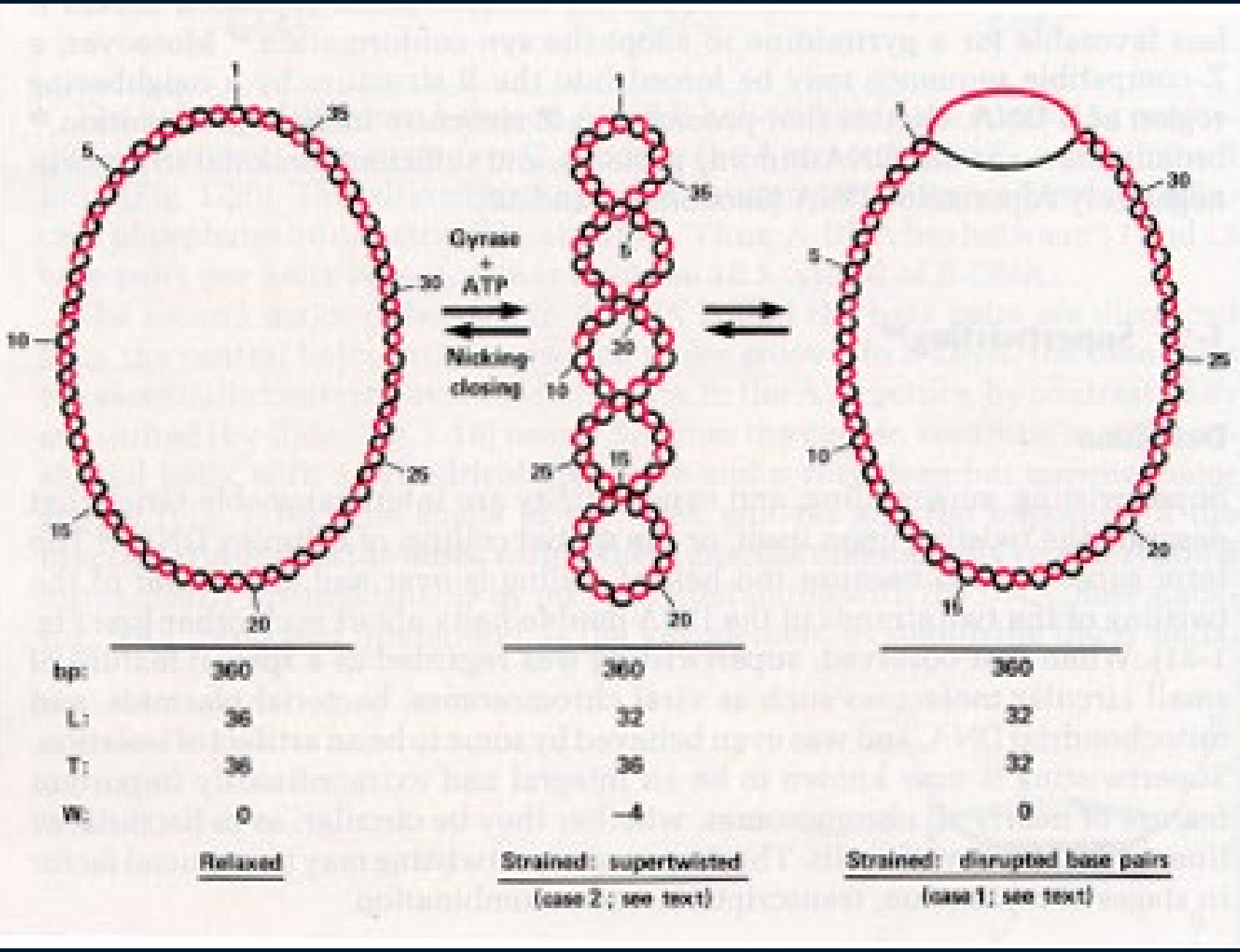


http://www.personal.psu.edu/rch8/workmg/Struc_Nucleic_Acids_Chpt2.htm

Upload your assignment to ICON

5) What is/are your favorites area(s) in topology

6) Any comments

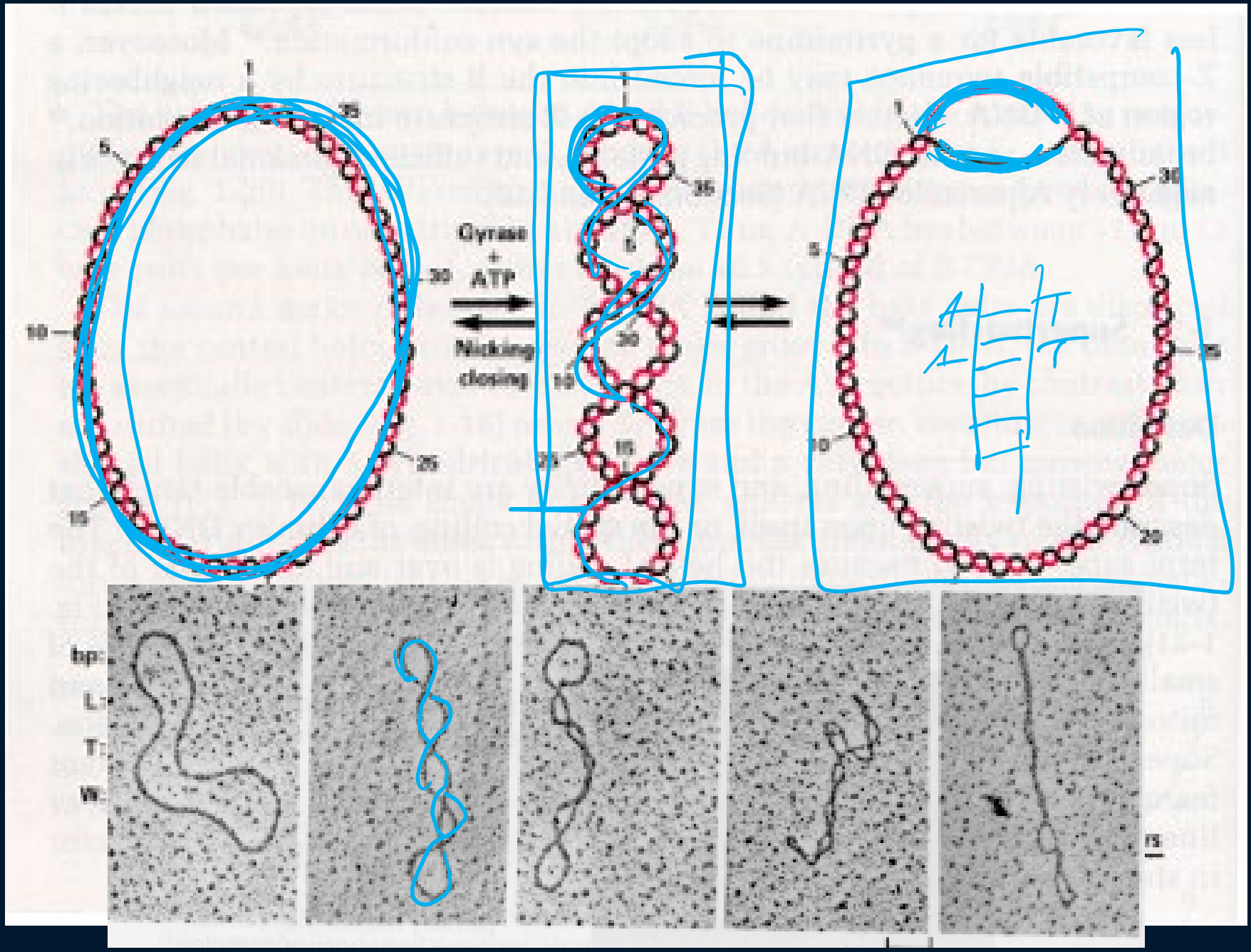
Due Friday

[3 pts] 1.) A picture that you might need for your thesis, paper, or anything else for which it would be useful if you could use software to draw that picture. Yes, I am thinking about knotplot, but not all of you may need knotplot for your figures, so you will get full credit for any figure you upload (but maybe knotplot can do more than what you think).

[0 pts] 2.) May I share your picture with Rob Scharein?

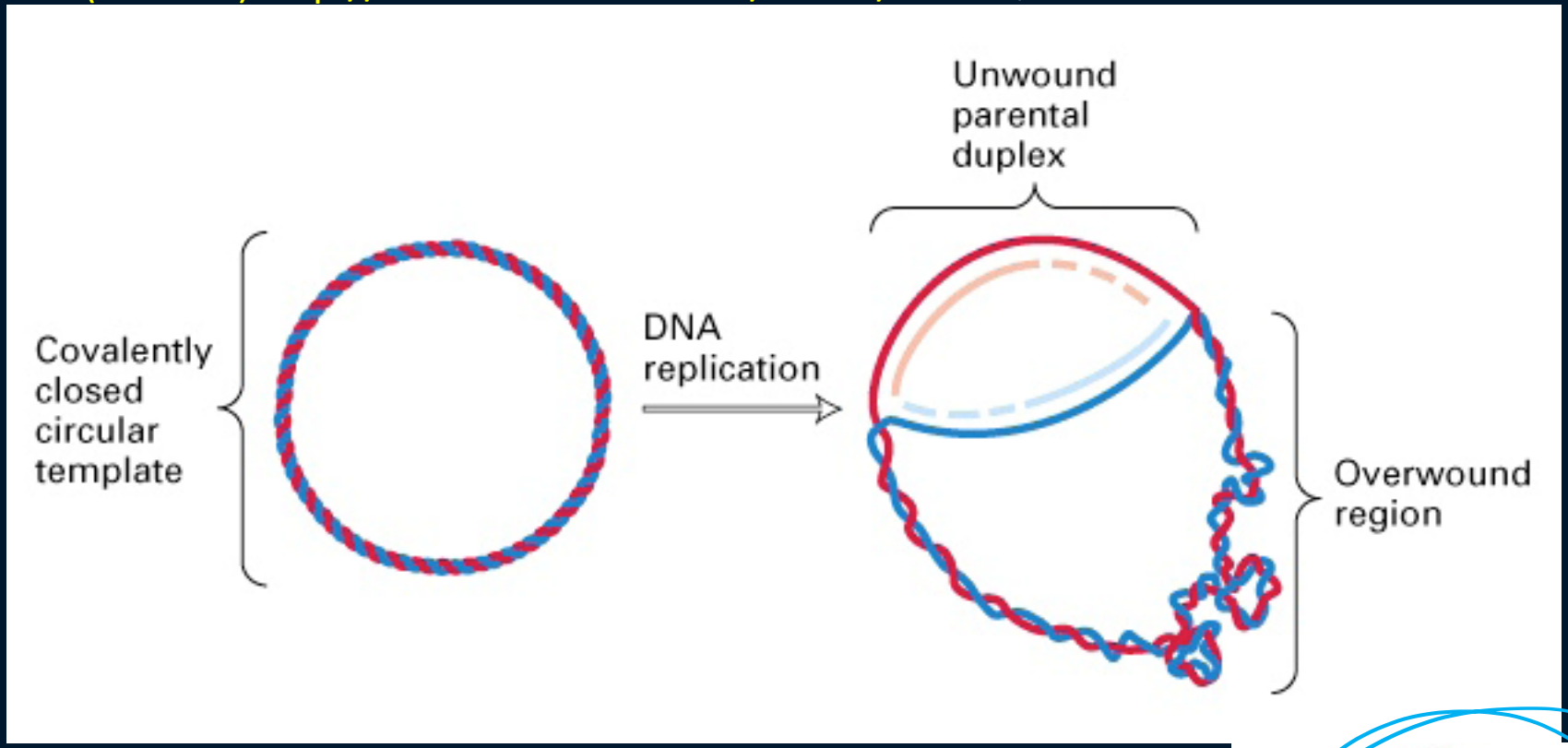
[4 pts] 3.) Pictures to show that the double branch cover of the unknot is S^3

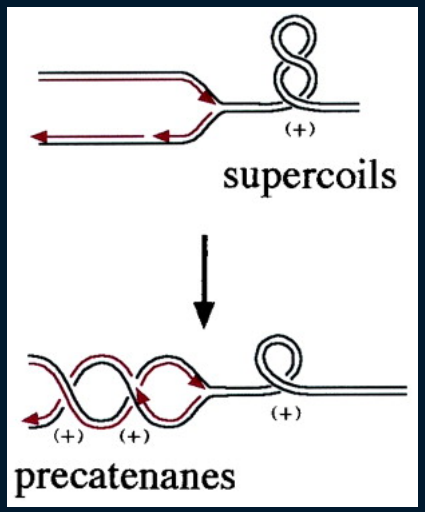
[3 pts] 4.) Draw the rational tangle (3, 1, 2)

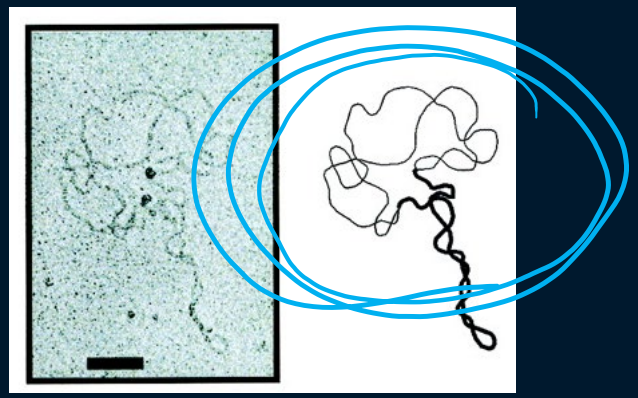


http://www.personal.psu.edu/rch8/workmg/Struc_Nucleic_Acids_Chpt2.htm

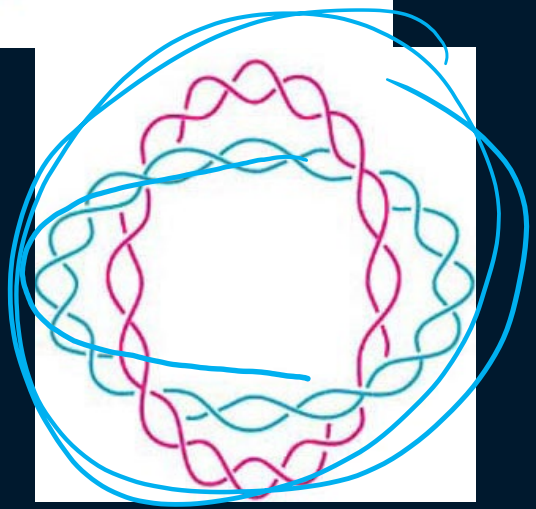
(J. Mann) http://www.sbs.utexas.edu/herrin/bio344/



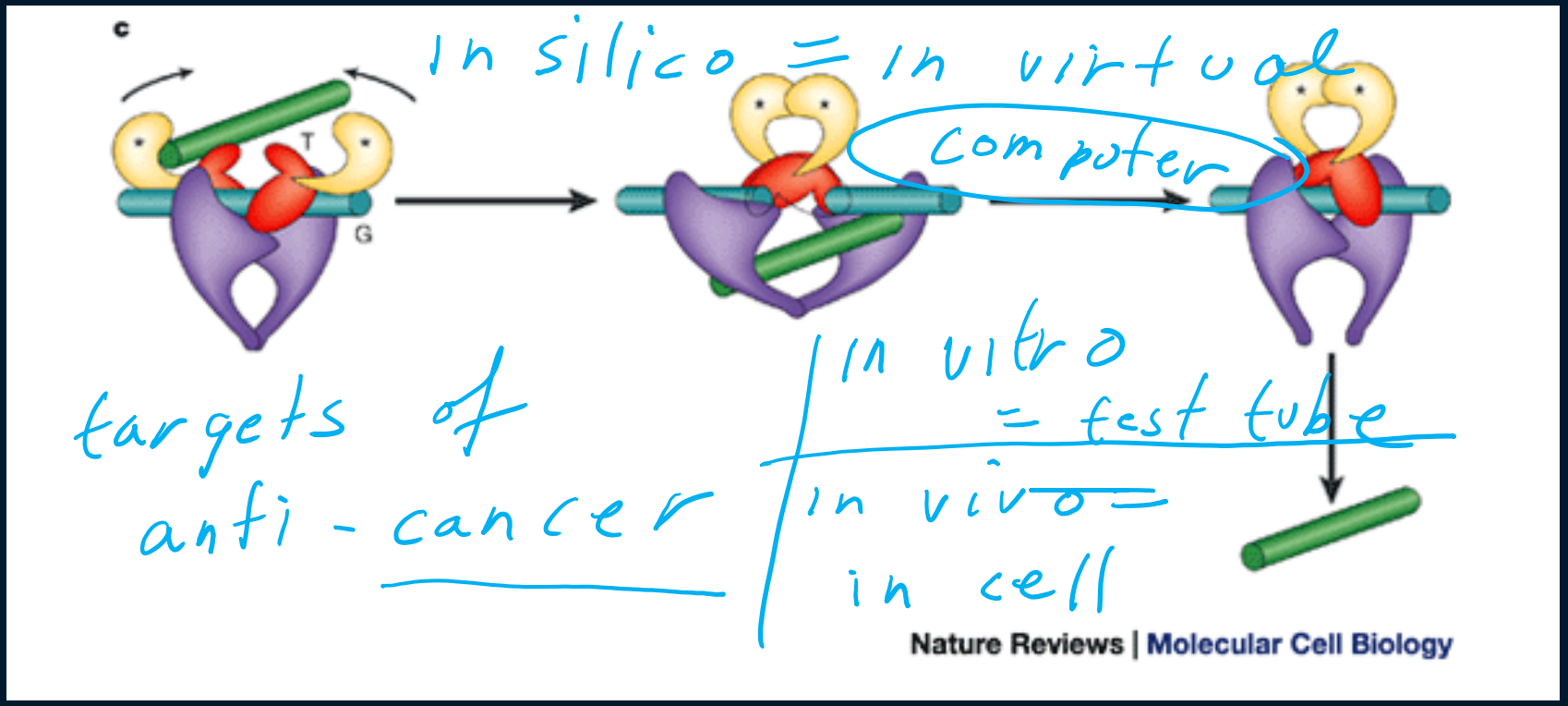




Postow L. et.al. PNAS;2001;98:8219-8226

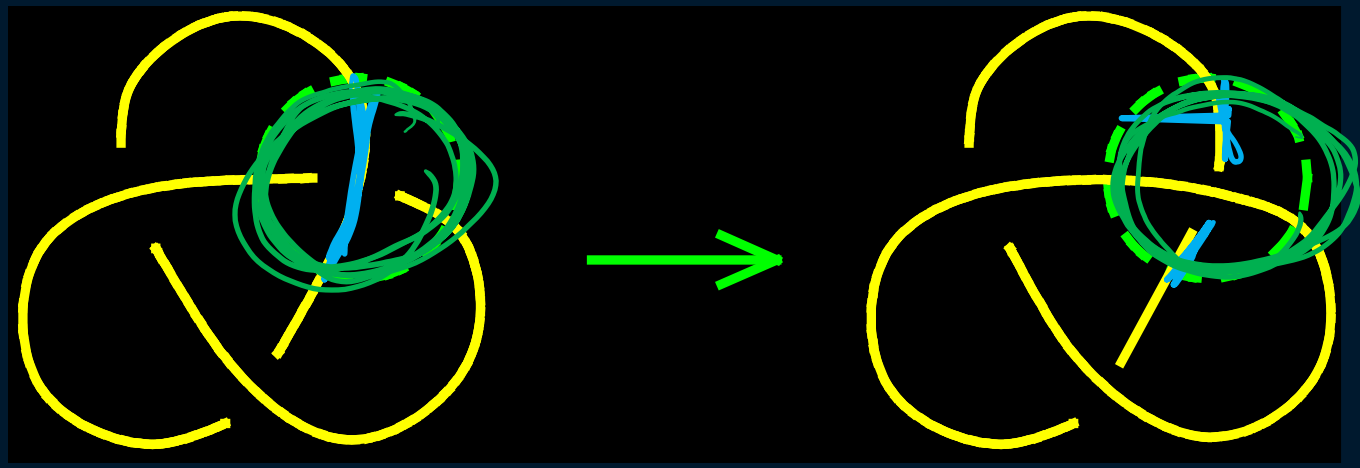


Topoisomerase II performing a crossing change on DNA:

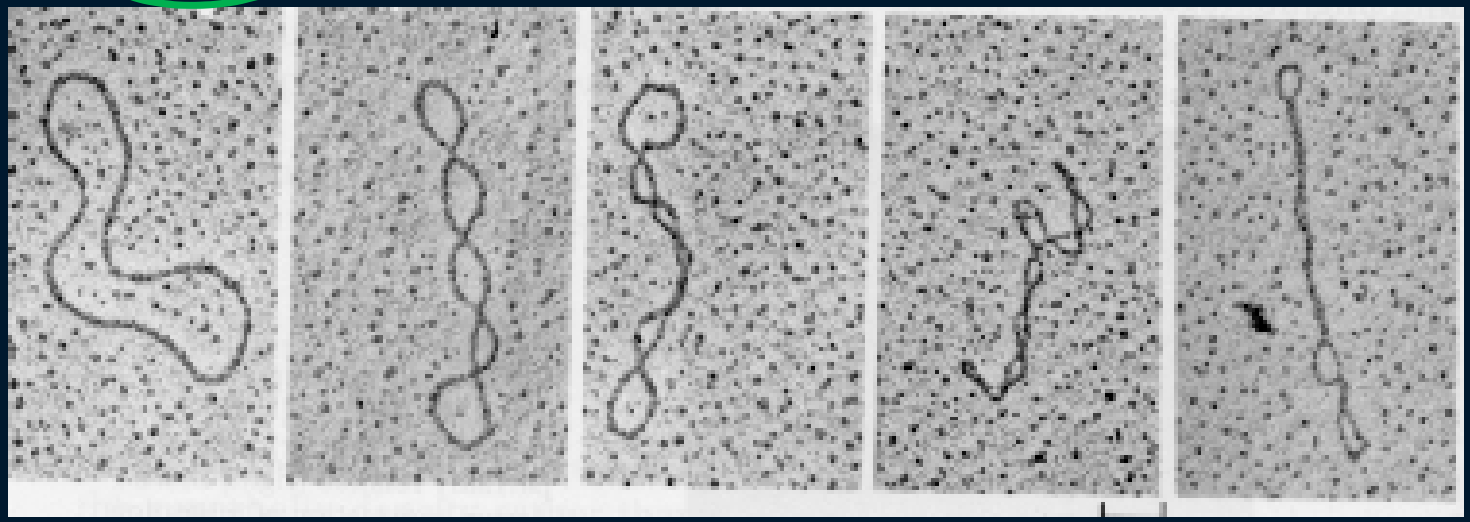


Cellular roles of DNA topoisomerases: a molecular perspective, James C. Wang, Nature Reviews Molecular Cell Biology 3, 430-440 (June 2002)

Topoisomerases are proteins which cut one segment of DNA allowing a second DNA segment to pass through before resealing the break.



DNA substrate = starting conformation of DNA before protein action



Usually unkotted, and supercoiled

circular

http://www.personal.psu.edu/rch8/workmg/Struc_Nucleic_Acids_Chpt2.htm

DNA substrate = starting conformation of DNA before protein action

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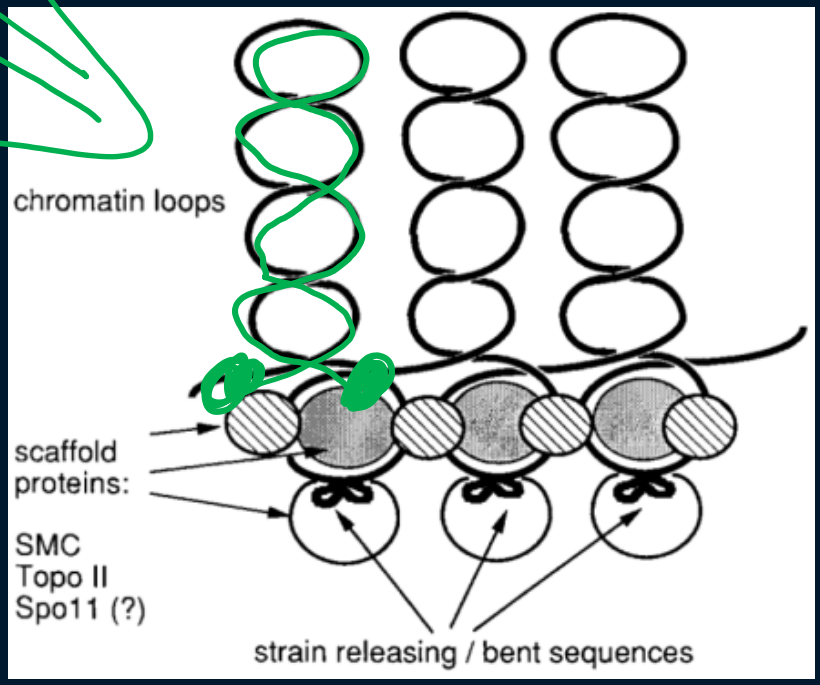


Meiotic double-strand breaks in yeast artificial chromosomes containing human DNA

Grzegorz Ira, Ekaterina Svetlova, Jan Filipski

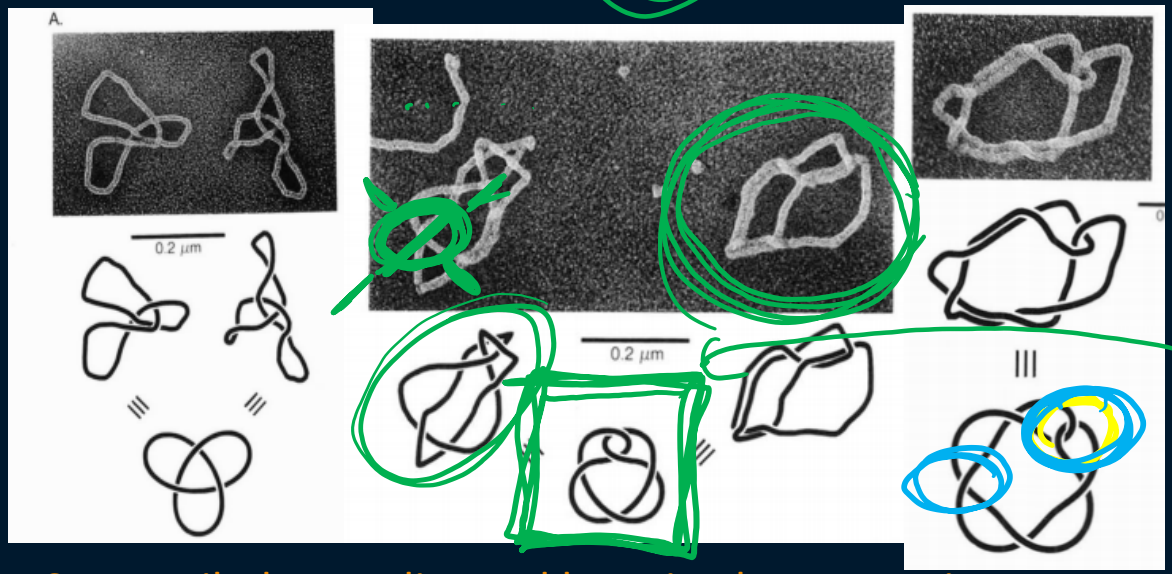
Nucl. Acids Res. (1998) 26 (10):2415-2419

DNA substrate = starting conformation of DNA before protein action

http://www.personal.psu.edu/rcb8/workmg/Struc_Nucleic_Acids_Chpt2.htm

Usually unkotted, and supercoiled

But can be knotted
Eg: Twist knots
(or torus knots/links)



Supercoiled **DNA**-directed knotting by **T4** topoisomerase.
Wasserman SA, Cozzarelli NR. J Biol Chem. 1991

THE JOURNAL OF BIOLOGICAL CHEMISTRY
Vol. 266, No. 30, Issue of October 25, pp

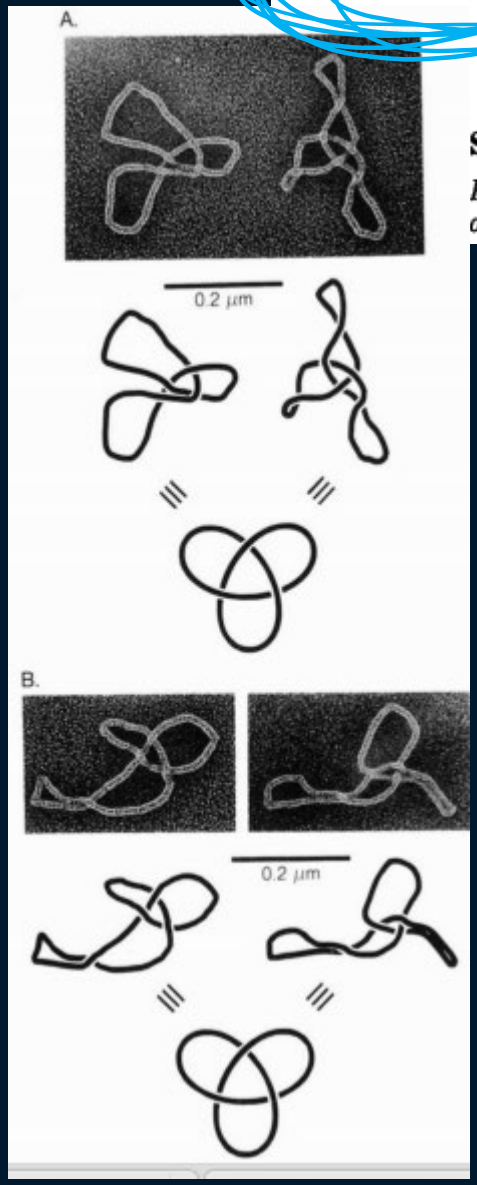
Supercoiled DNA-directed Knotting by T4 Topoisomerase*

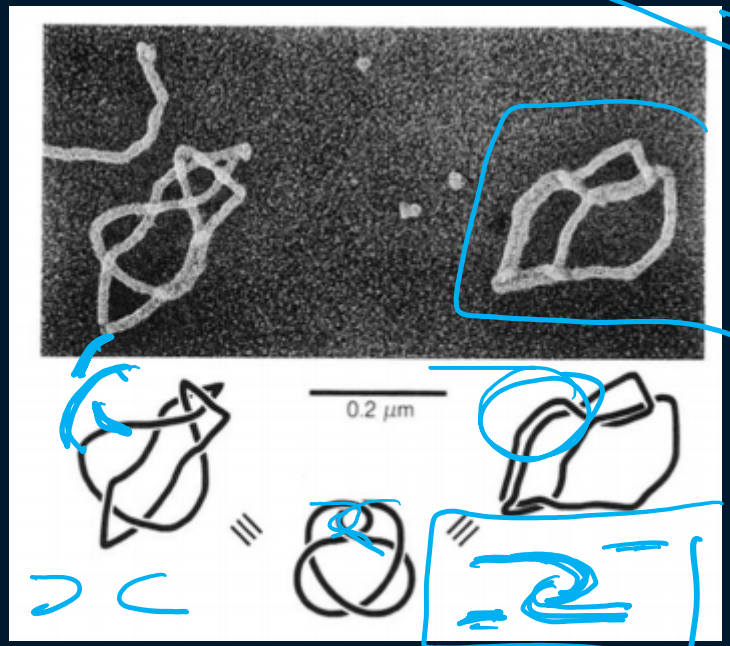
Twist Knots

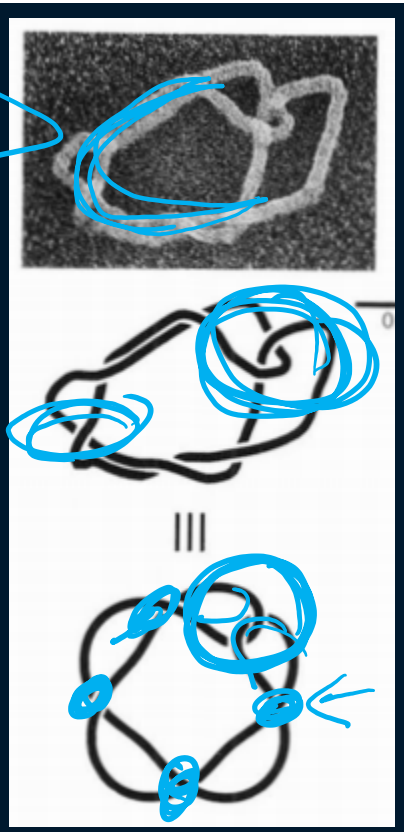
(Received for publication,

Steven A. Wasserman‡§ and Nicholas R. Cozzarelli¶

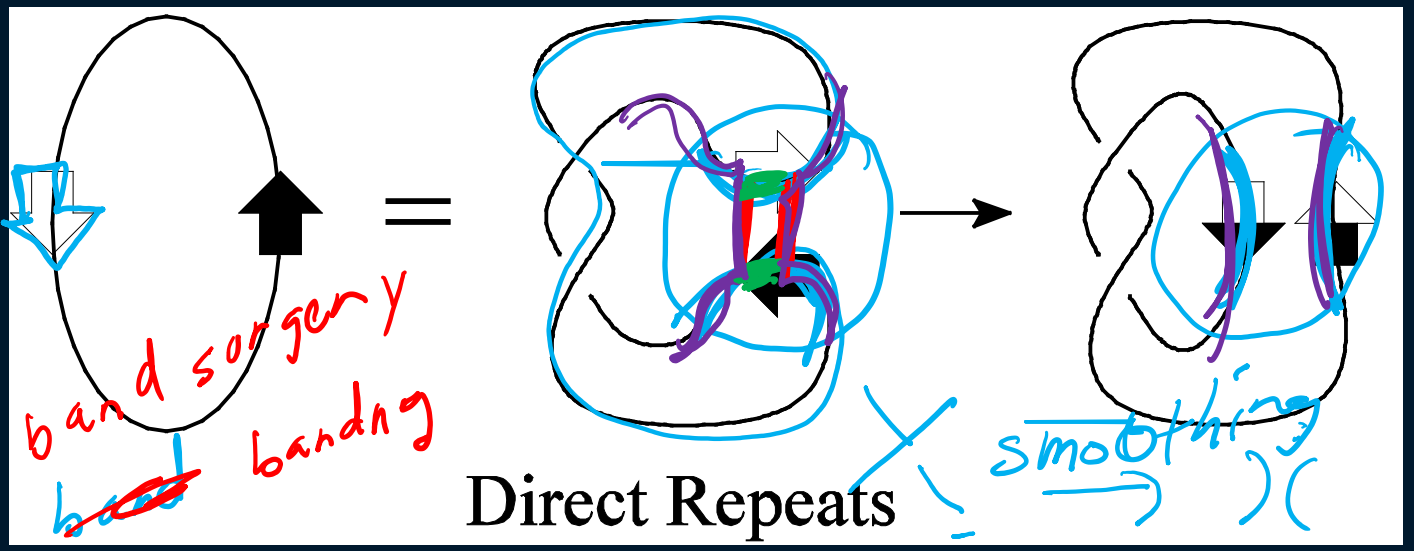
From the ‡Department of Biochemistry, University of Texas Southwestern Medical Center, Dallas, Texas 75235 and the ¶Department of Molecular Biology, University of California, Berkeley, California 94720

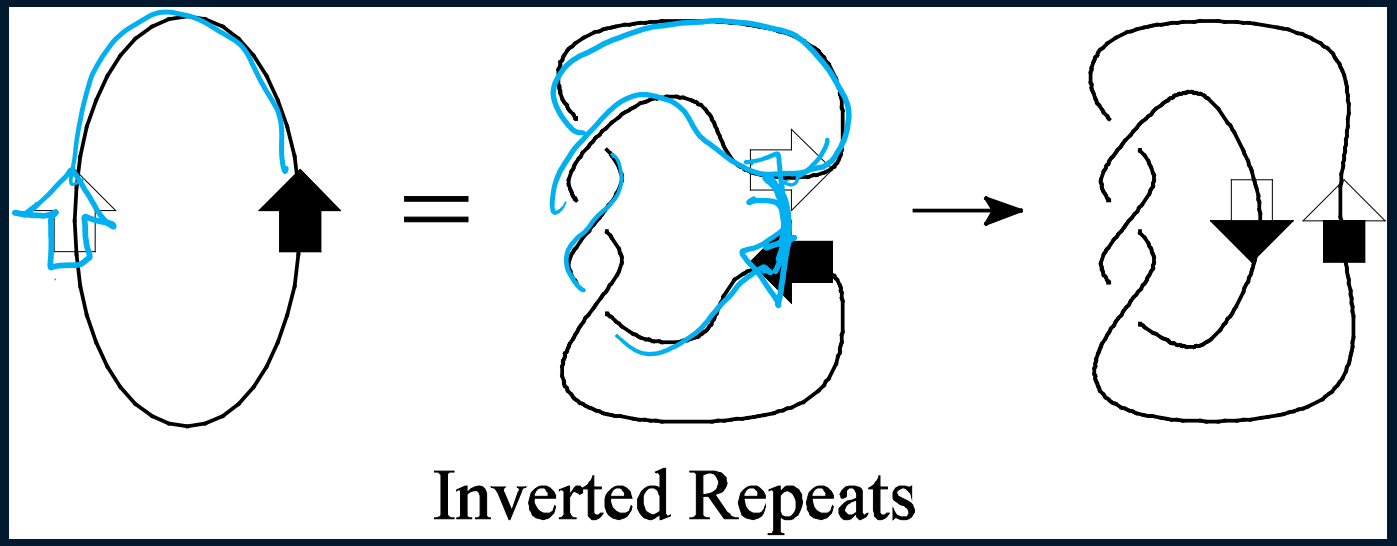




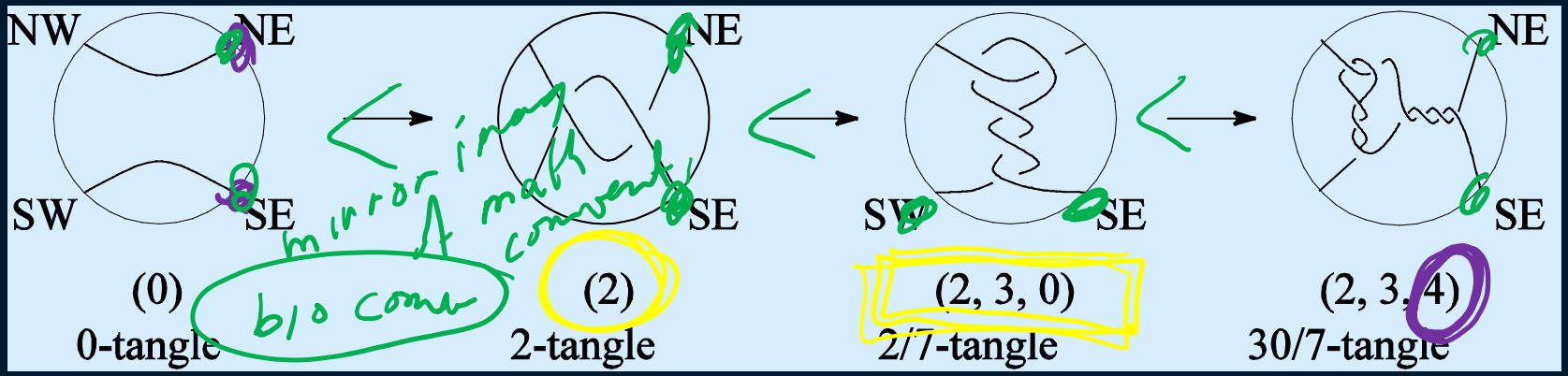


Recombination:





Rational Tangles



Rational tangles alternate between vertical crossings & horizontal crossings.

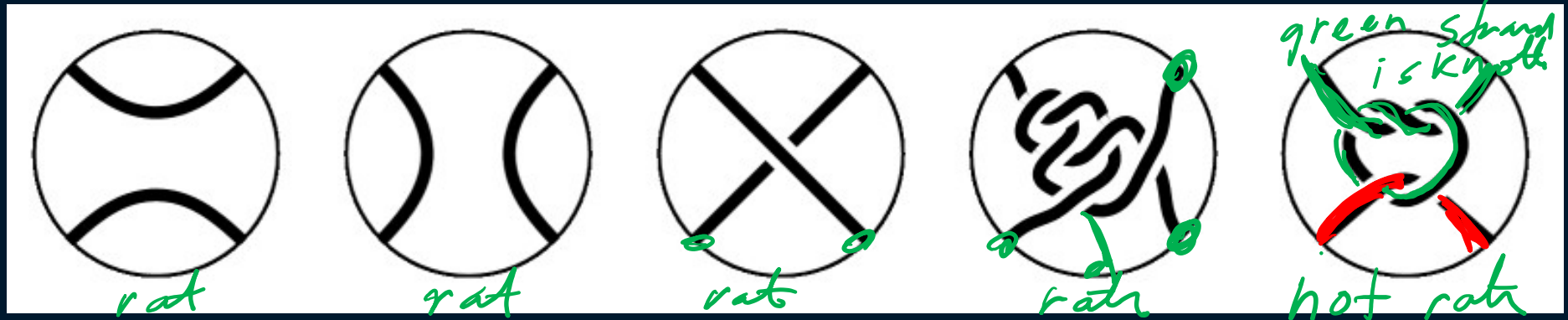
k horizontal crossings are right-handed if k > 0
k horizontal crossings are left-handed if k < 0

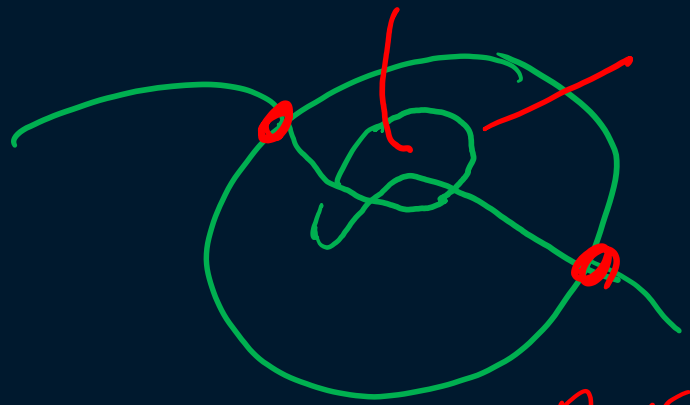
k vertical crossings are left-handed if k > 0
k vertical crossings are right-handed if k < 0

Note that if k > 0, then the slope of the overcrossing strand is negative, while if k < 0, then the slope of the overcrossing strand is positive.

By convention, the rational tangle notation always ends with the number of horizontal crossings.

Tangles

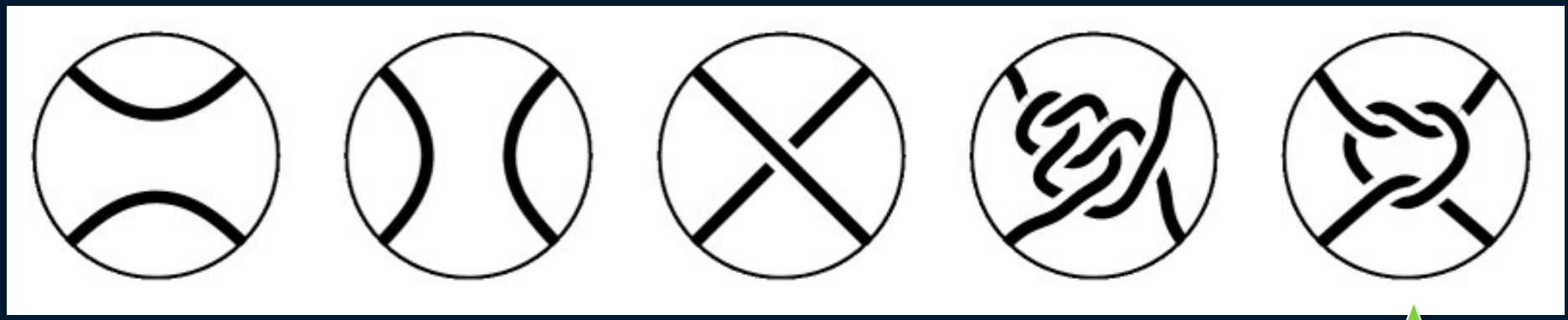




not locally knotted

thus it is prime

Which tangles are rational?



This one is not rational.
The others are all rational