



Chapter 7.3 pp. 162-170

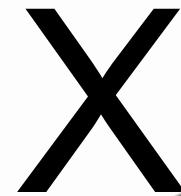


Draw

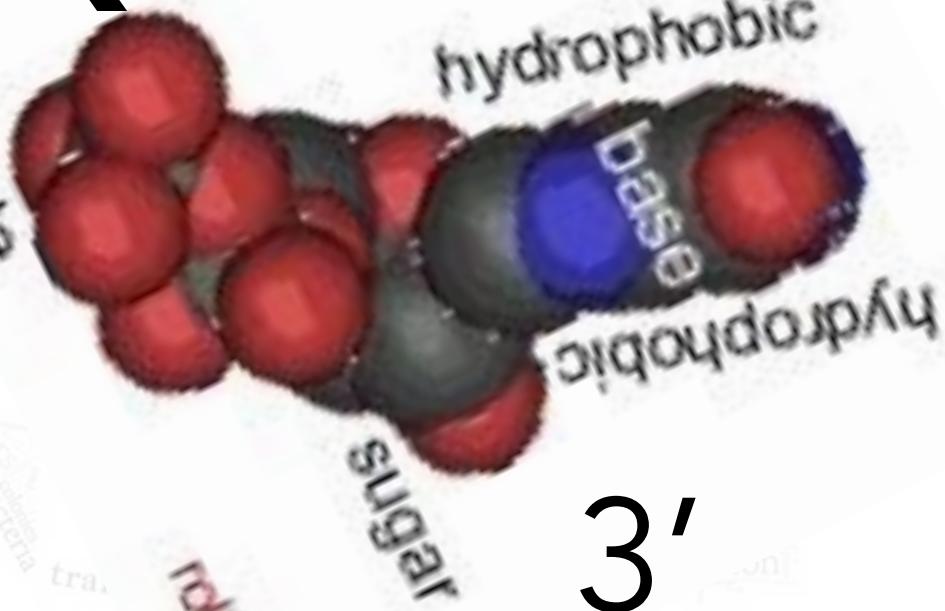
Erase ▾

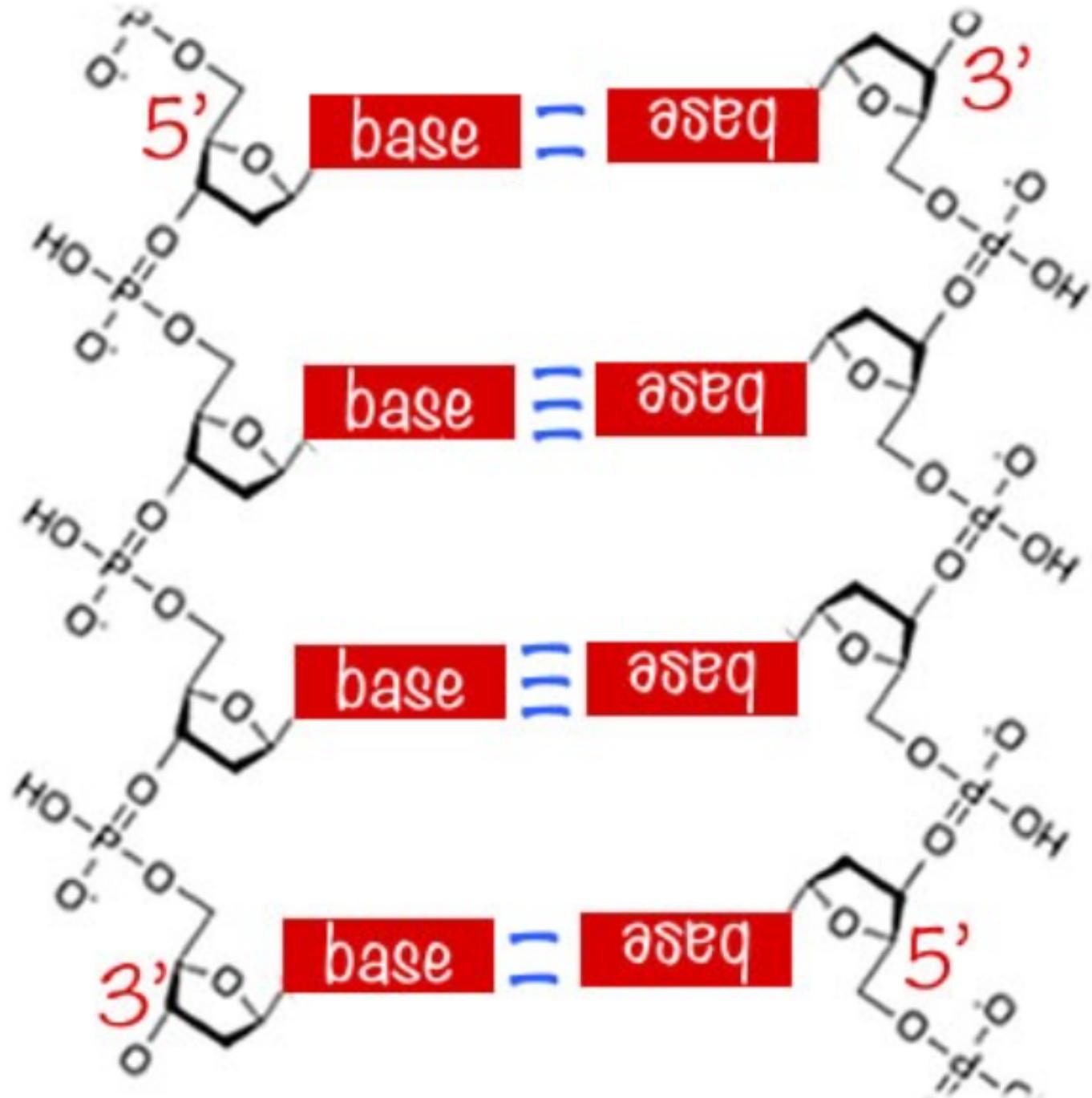
Reset

5'

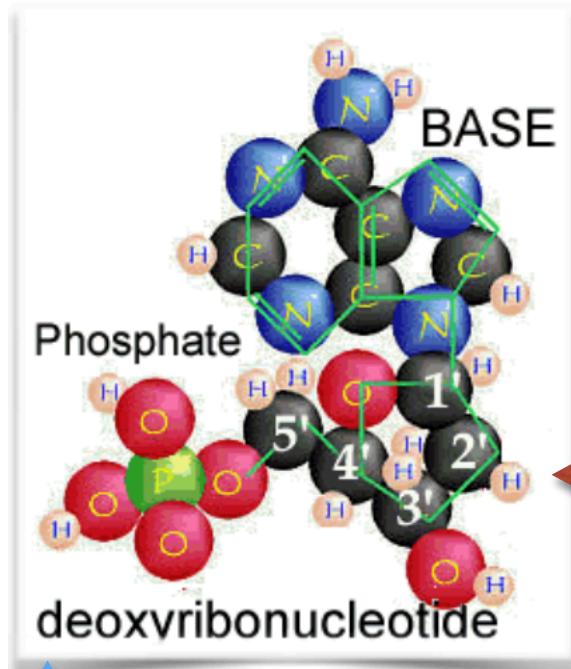


3'



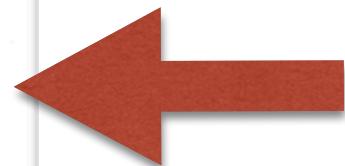


# RNA

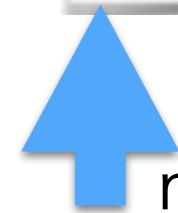


Uracil rather than Thymine

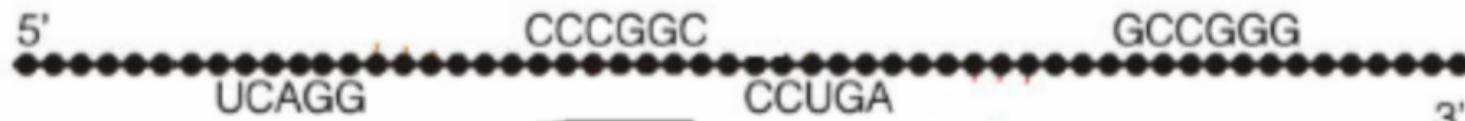
-OH group in RNA  
(ribonucleotide)



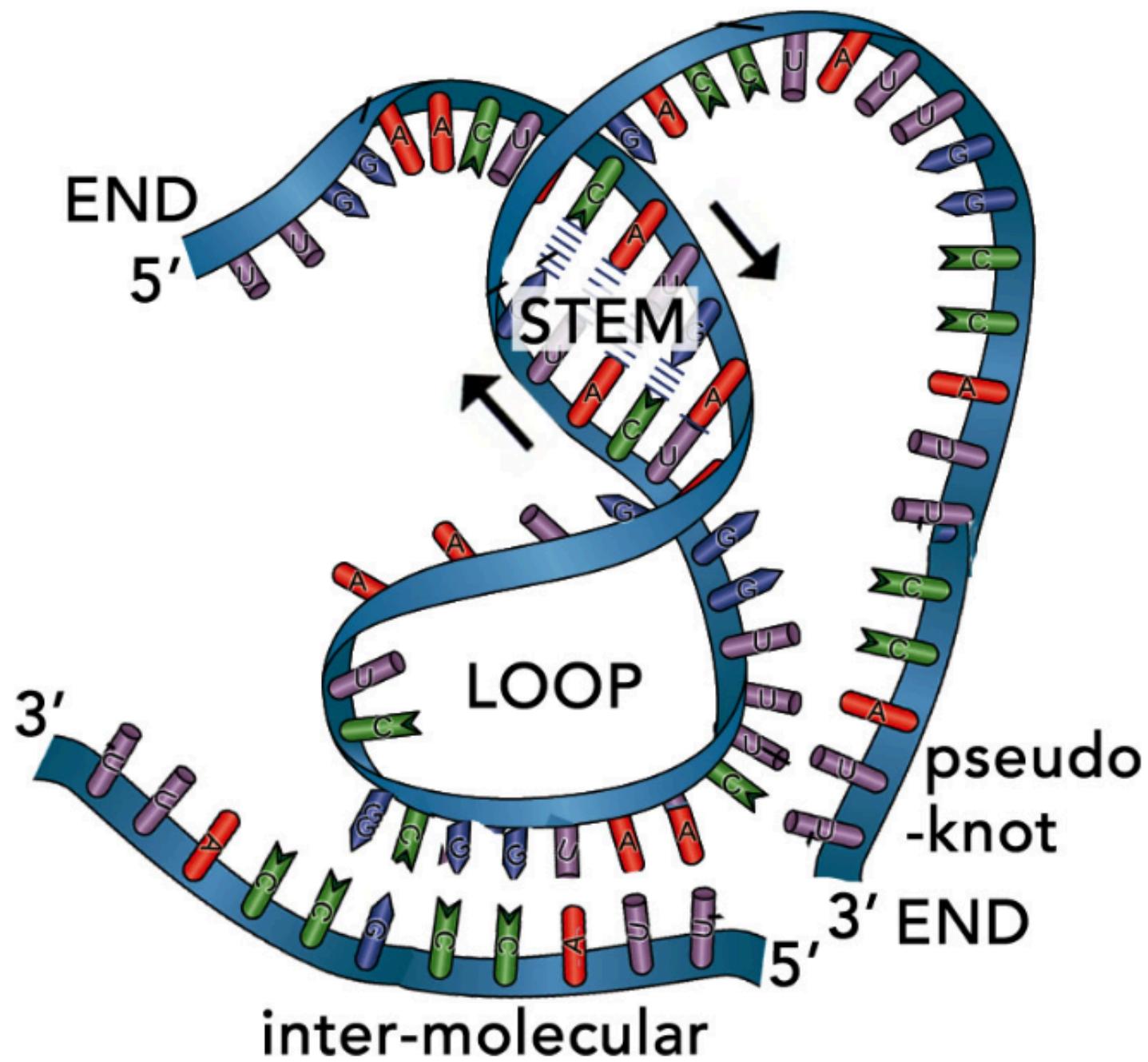
mono- di- or tri- phosphate



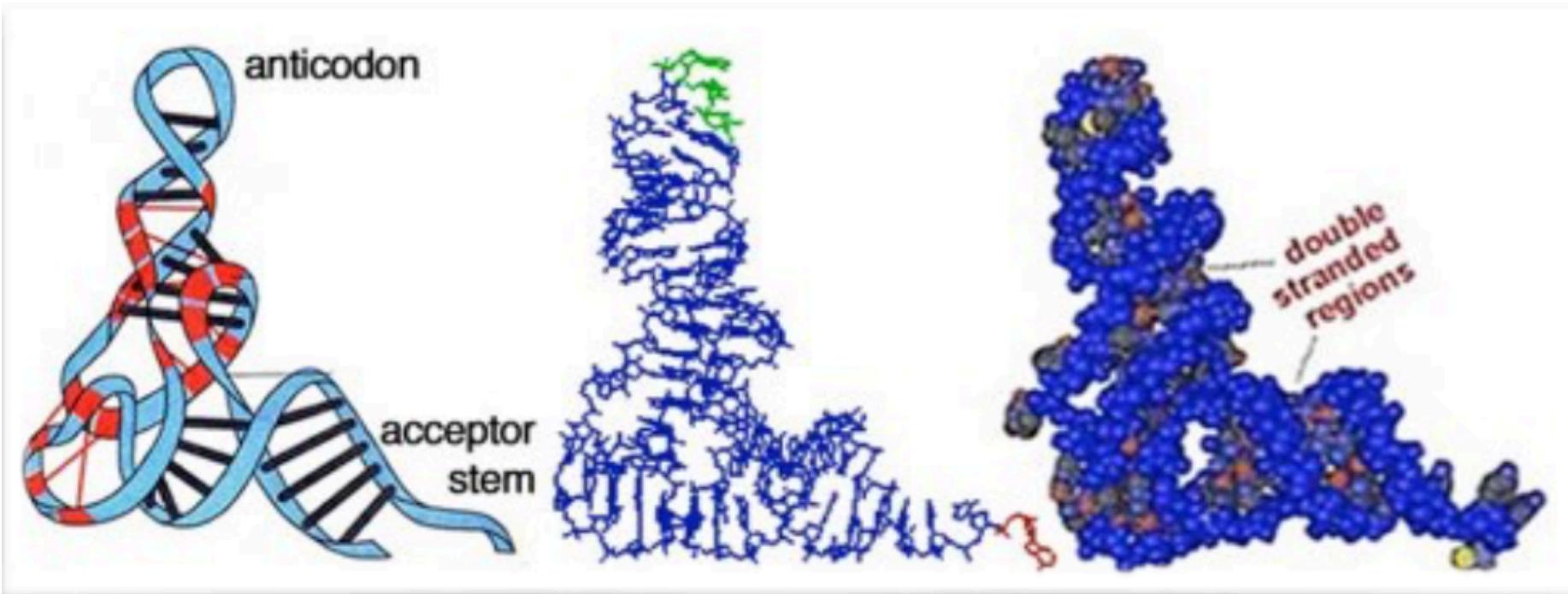
here is an RNA molecule -- how might it fold in solution? If you can indicate where the UCAGG and CCCGGGC sequences are.



 12141	 12142	 12145	 12146	 12148	 12151
 12153	 12154	 12156	 12157	 12160	 12162
 12163	 12164	 12165	 12166	 12167	 12169



# transfer RNA (tRNA)



# catalytic RNAs (ribozymes)

# Key, non-deducible facts about DNA replication

1. DNA-dependent DNA-polymerase cannot start de novo, it requires a “primer” (normally RNA)
2. DNA-dependent RNA-polymerase does not need a primer, it can start de novo
3. Both polymerases add new nucleotide triphosphate to the 3' end of nucleic acid polymer (either DNA or RNA).
4. There is no RNA in a replicated DNA molecule.
5. There are no breaks in a replicated DNA molecule.

**double helix has to open:** specific origin of replication sites (sequences and proteins that recognize them)

DNA-dependent DNA-polymerase **needs to stay attached** (clamp), that is, not diffuse away.

**Proof-reading** (exonuclease) activity - removing mismatched bases; increase in fidelity of replication.

**Unwinding stress** associated with replicating DNA needs to be relieved: **type I topoisomerase**

Given what you know about DNA replication, draw and label a picture of the double stranded, circular DNA molecule halfway through its replication. Indicate the replication origin(s) and fork(s).

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## Draw

Era

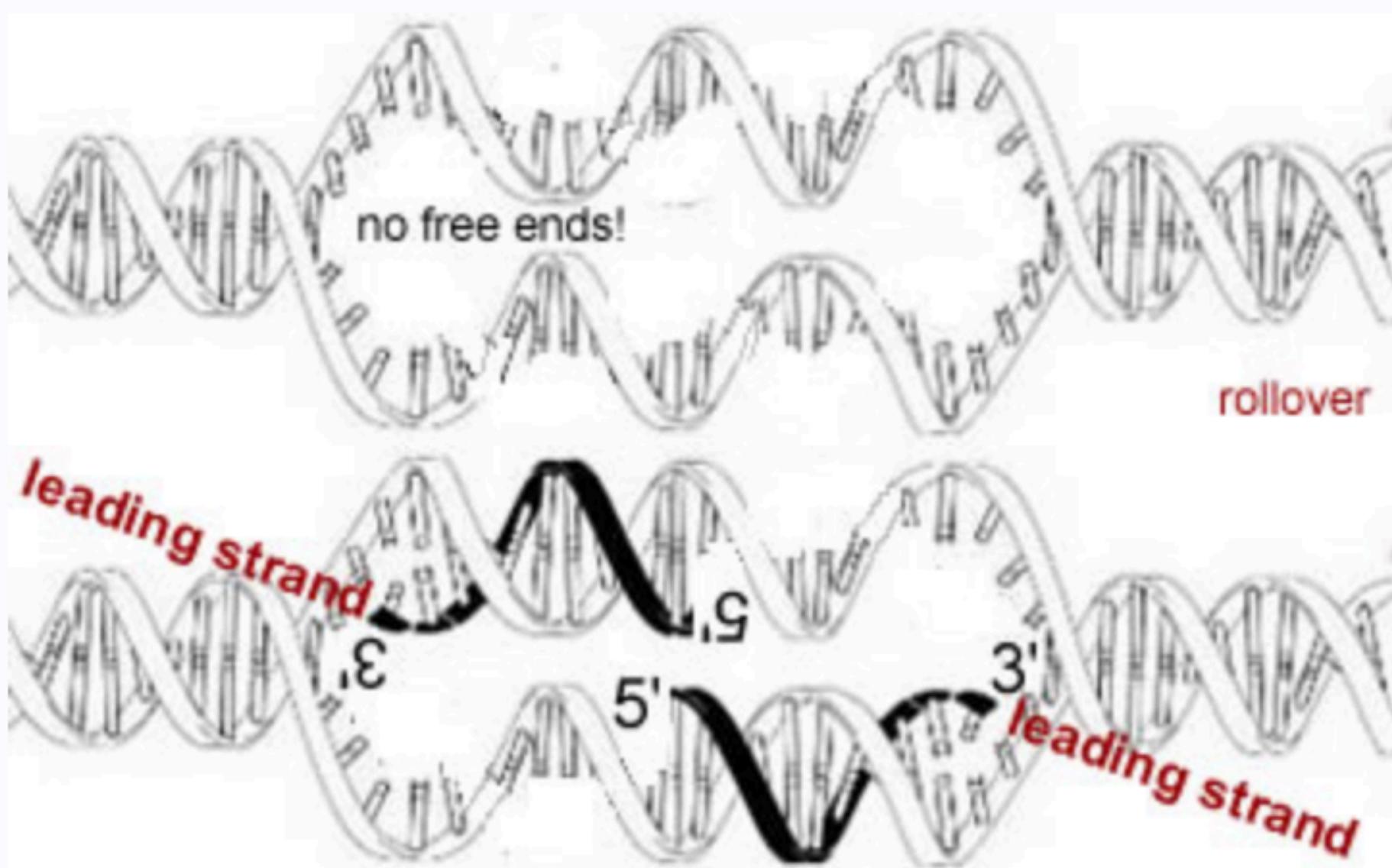
30589

30590

30591

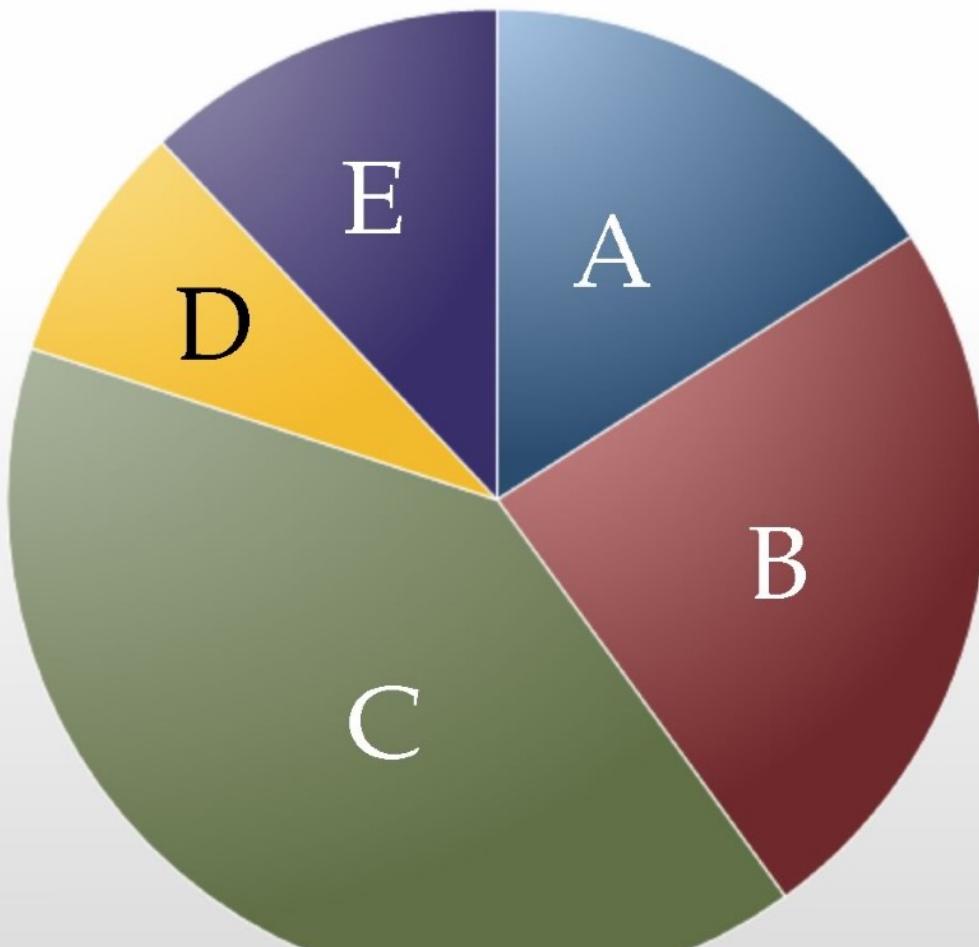
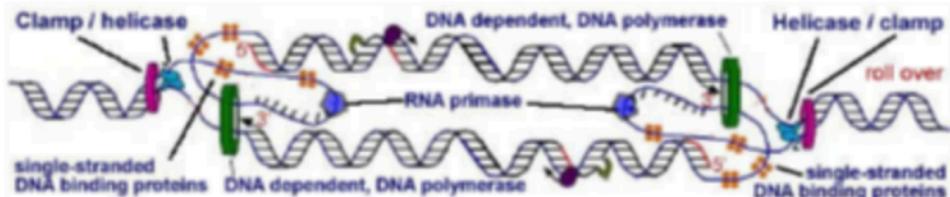
30593

where are the RNA primers?



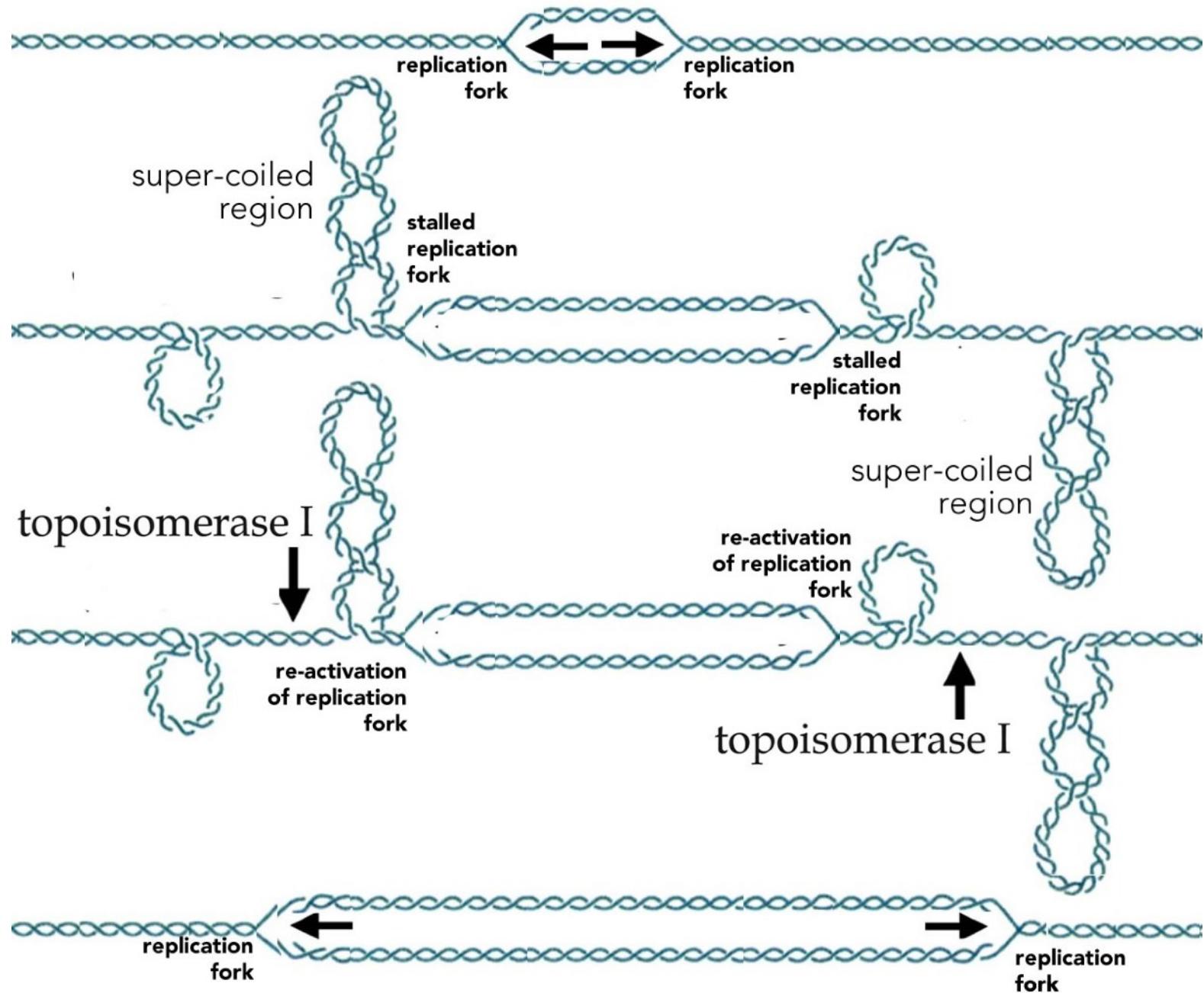
video

There is a mutation that inactivates a **single** protein. DNA synthesis begins and proceeds in both directions around the DNA molecule, but then slows and stops. Which protein is most likely to have been inactivated by the mutation?



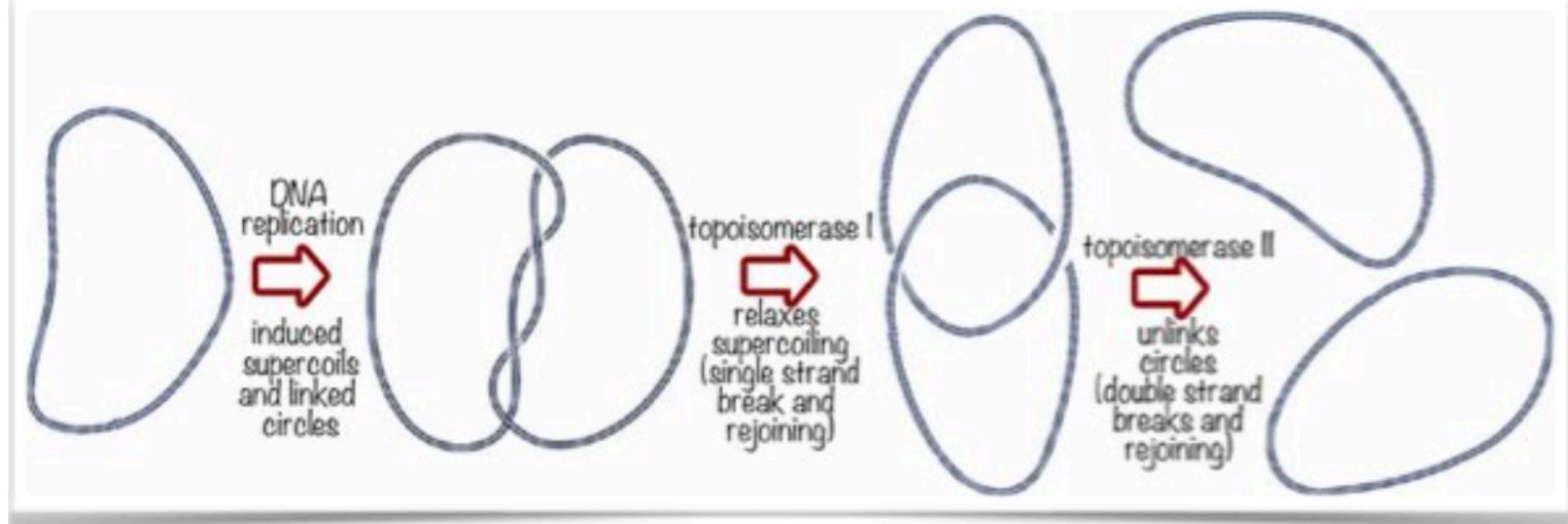
- A: Replication origin binding protein
- B: type I topoisomerase
- C: DNA-dependent, DNA-polymerase
- D: DNA ligase
- E. no idea

# unraveling



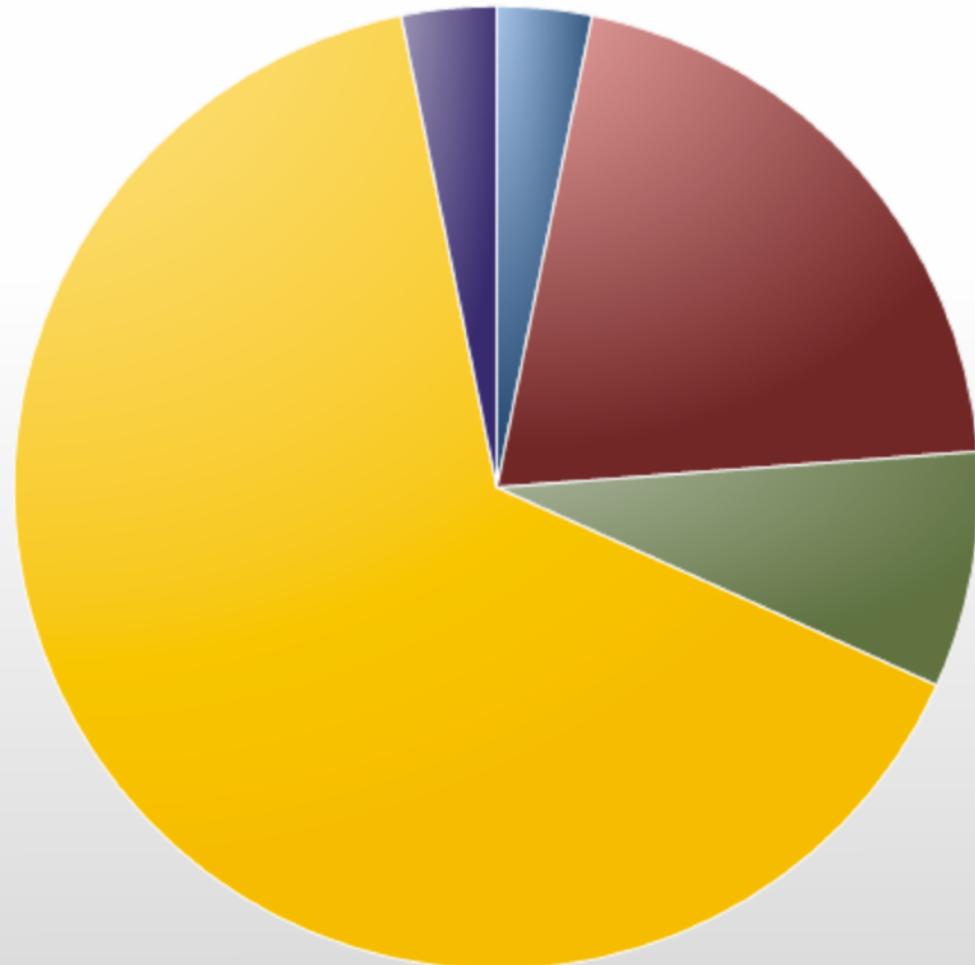
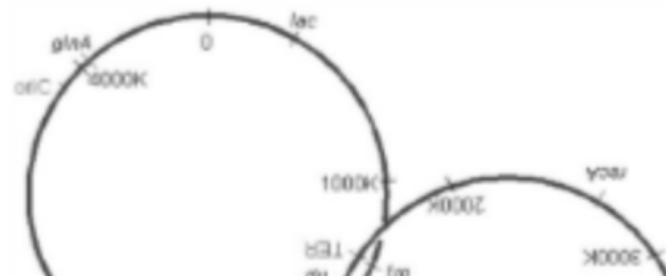
DNA circles (prokaryotes) -

# topological linking needs to be resolved: type II topoisomerase



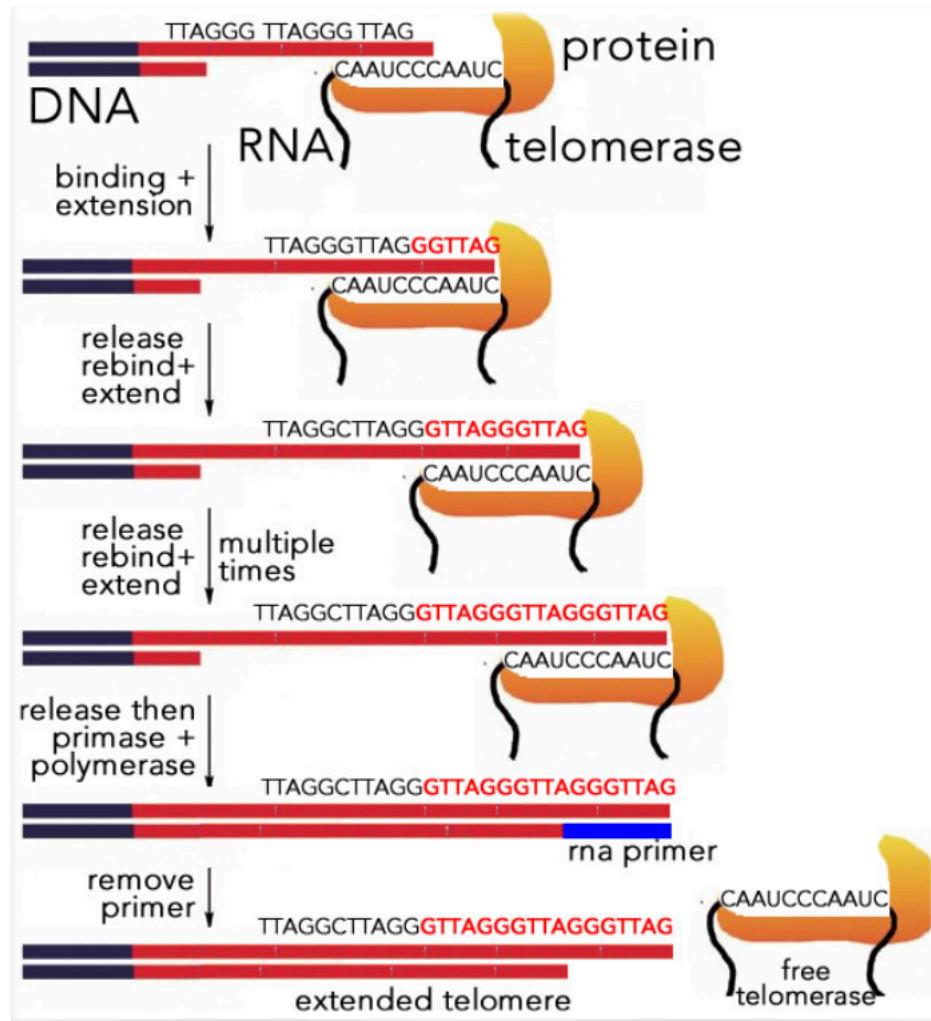
**Q:** There is a mutation that inactivates a single enzymatic activity. DNA synthesis begins and proceeds to completion, but the two DNA molecules remains intertwined. Which protein is most likely to be inactive?

- a. Origin binding protein
- b. type I topoisomerase



- a. Origin binding protein
- b. type I topoisomerase
- c. DNA-dependent, DNA-polymerase
- d. type II topoisomerase.
- e. DNA ligase

# Linear DNA molecules (telomeres)



## Questions to answer

During DNA/RNA synthesis what is the average ratio of productive to unproductive interactions between an incoming nucleotide and the polymerase?

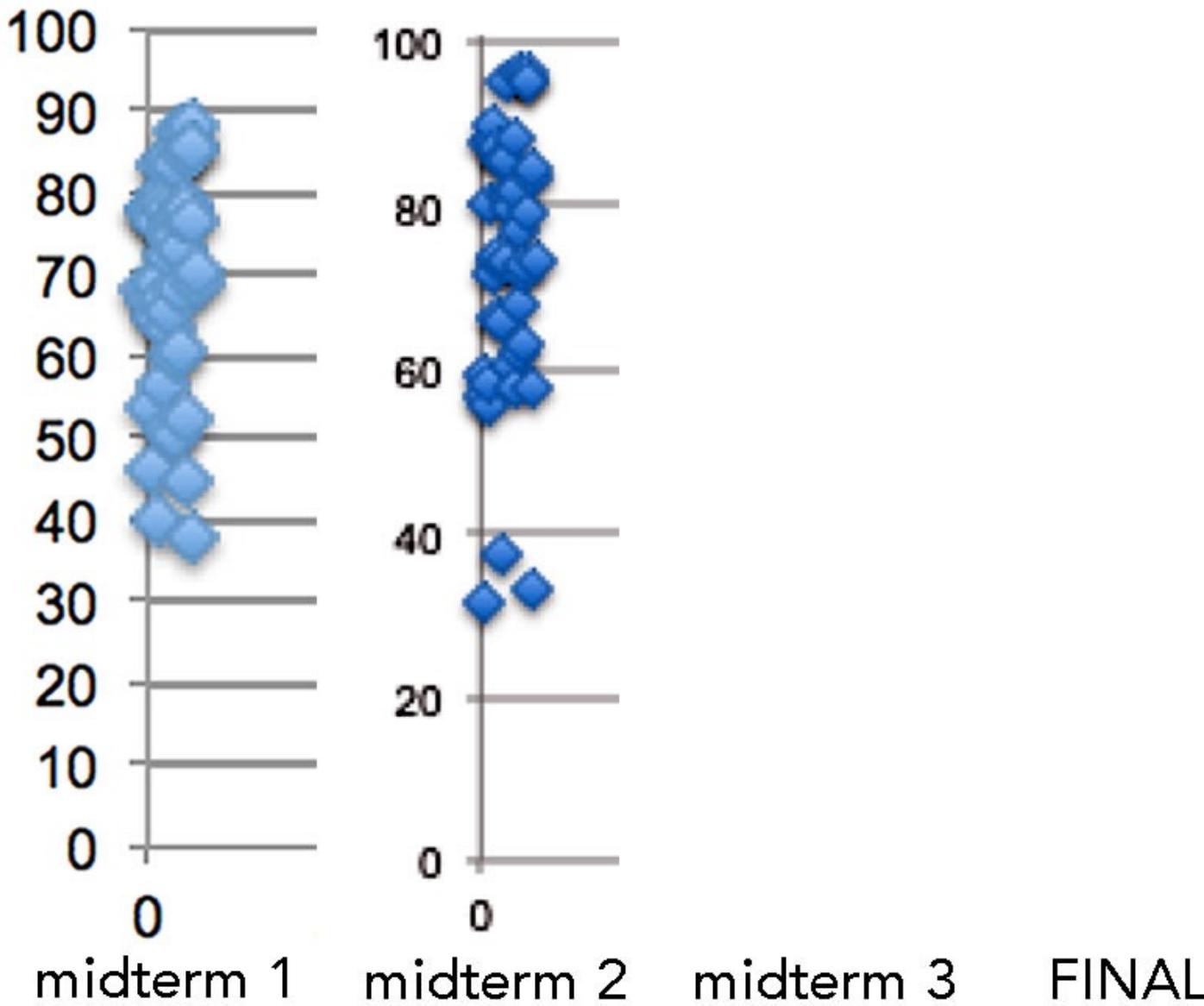
Why do you need to denature (melt) the DNA double-helix to copy it?

How would DNA replication change if H-bonds were as strong as covalent bonds?

How would evolution be impacted if DNA were totally stable and DNA replication was error-free?

What would be the impact of mutations that altered the proof-reading function of the DNA polymerase complex?

How might mutations in the genes encoding the clamp/clamp-loader system influence DNA replication?



next beSocratic will be ready after 2PM today