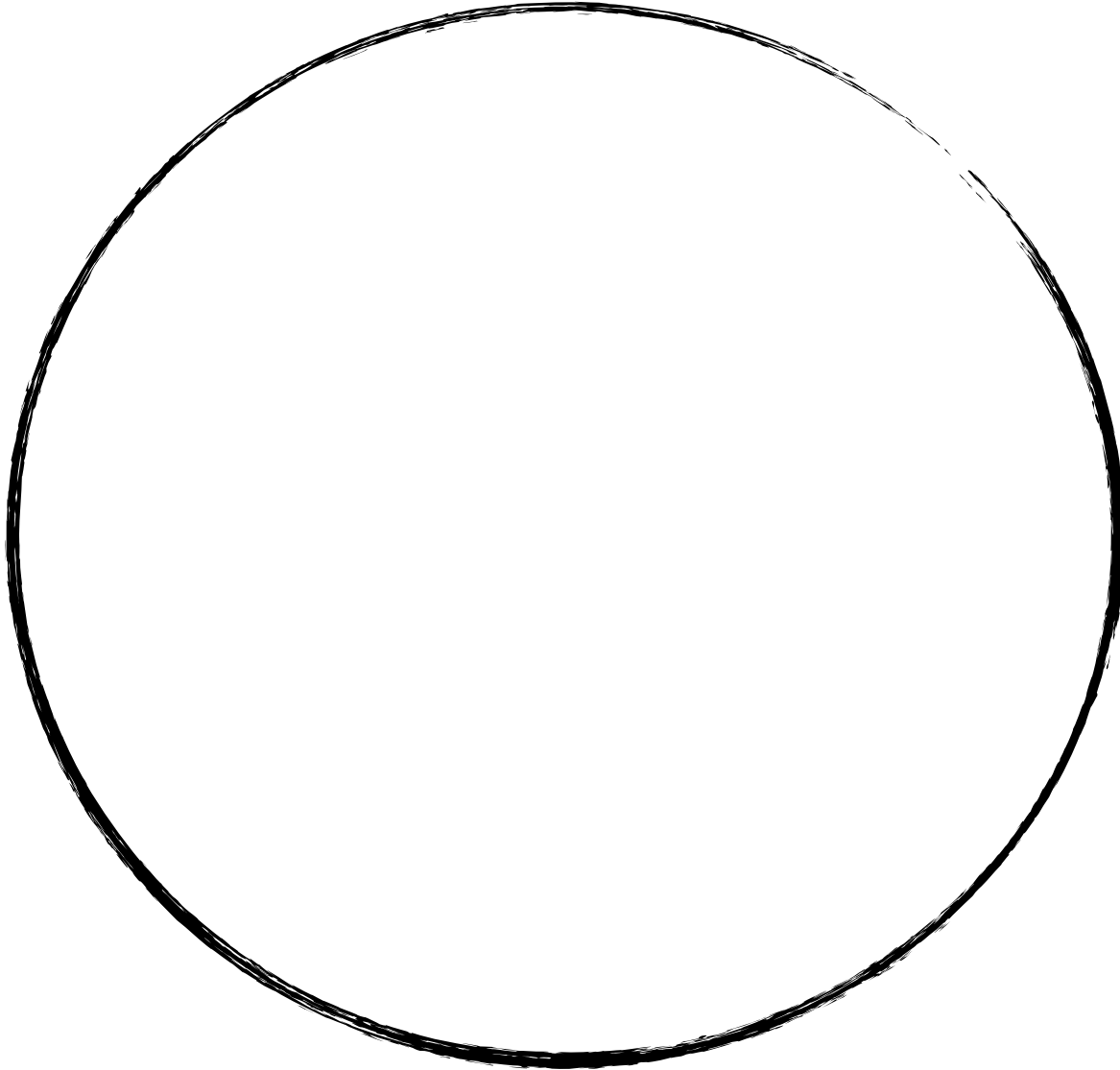


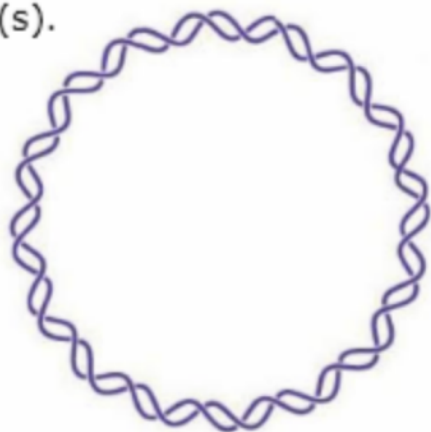


course web site

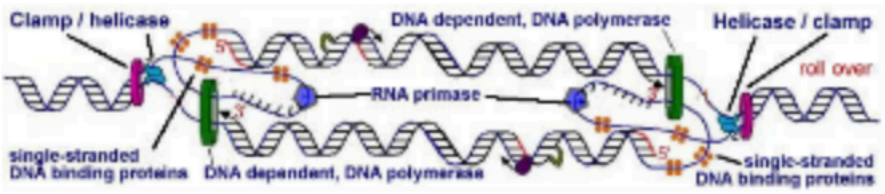
Group work: outline the molecular activities (proteins) and processes involved in the replication and segregation of a circular chromosome.



Here is a circular DNA molecule; given what you know about the properties of DNA polymerase, draw and label a picture of the molecule halfway through its replication. Indicate the replication origin(s) and fork(s).



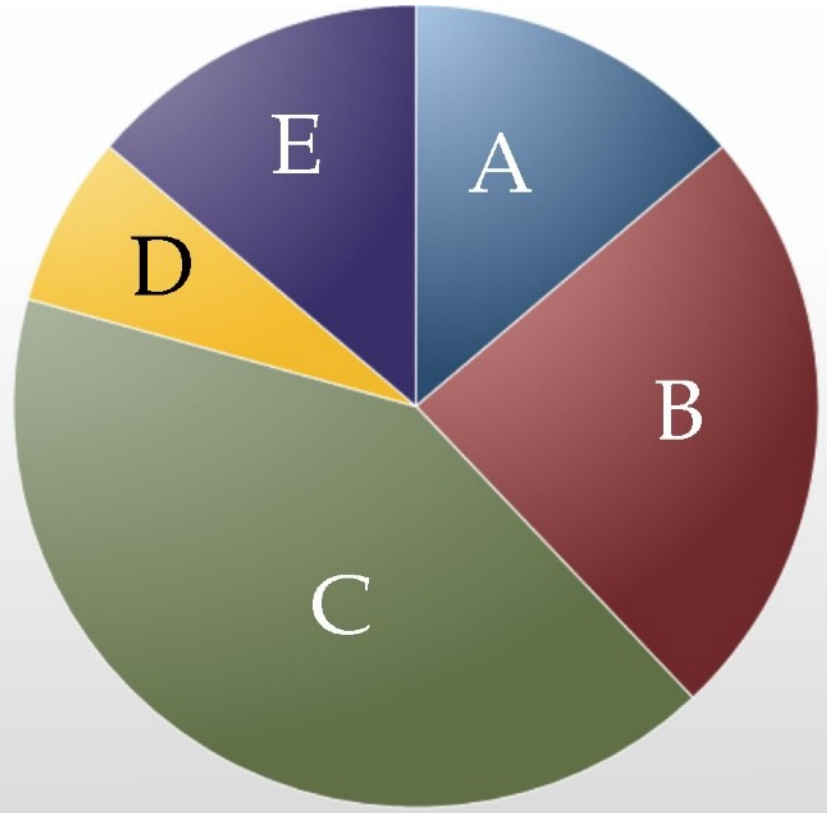
There is a mutation that inactivates a **single** protein. DNA synthesis begins and proceeds in both directions around the DNA molecule, but then slows and stops. Which protein is most likely to have been inactivated by the mutation?



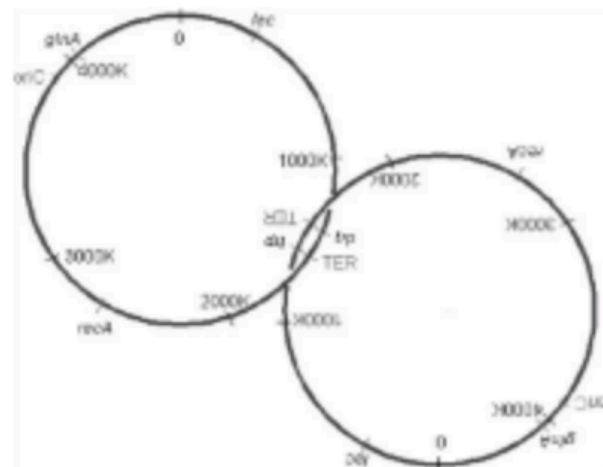
explain why the other choices cannot be correct

what inactivating mutations in the other activities do?

- ☐ A: Replication origin binding protein
- ☐ B: type I topoisomerase
- ☐ C: DNA-dependent, DNA-polymerase
- ☐ D: DNA ligase



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



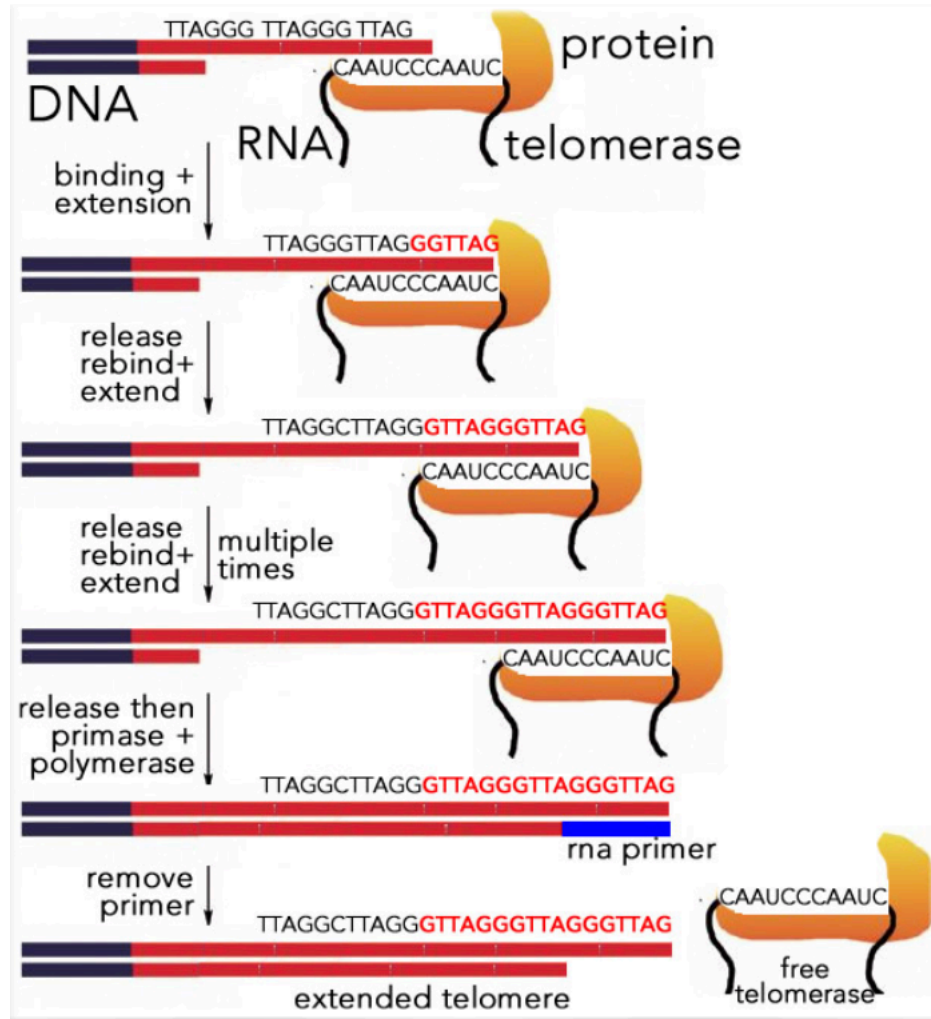
- ☐ A. Origin binding protein
- ☐ B. type I topoisomerase
- ☐ C. DNA-dependent, DNA-polymerase
- ☐ D. type II topoisomerase.

Group work: outline the molecular activities (proteins) and processes involved in the replication and segregation of a linear chromosome.



Linear DNA molecules (telomeres)

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?

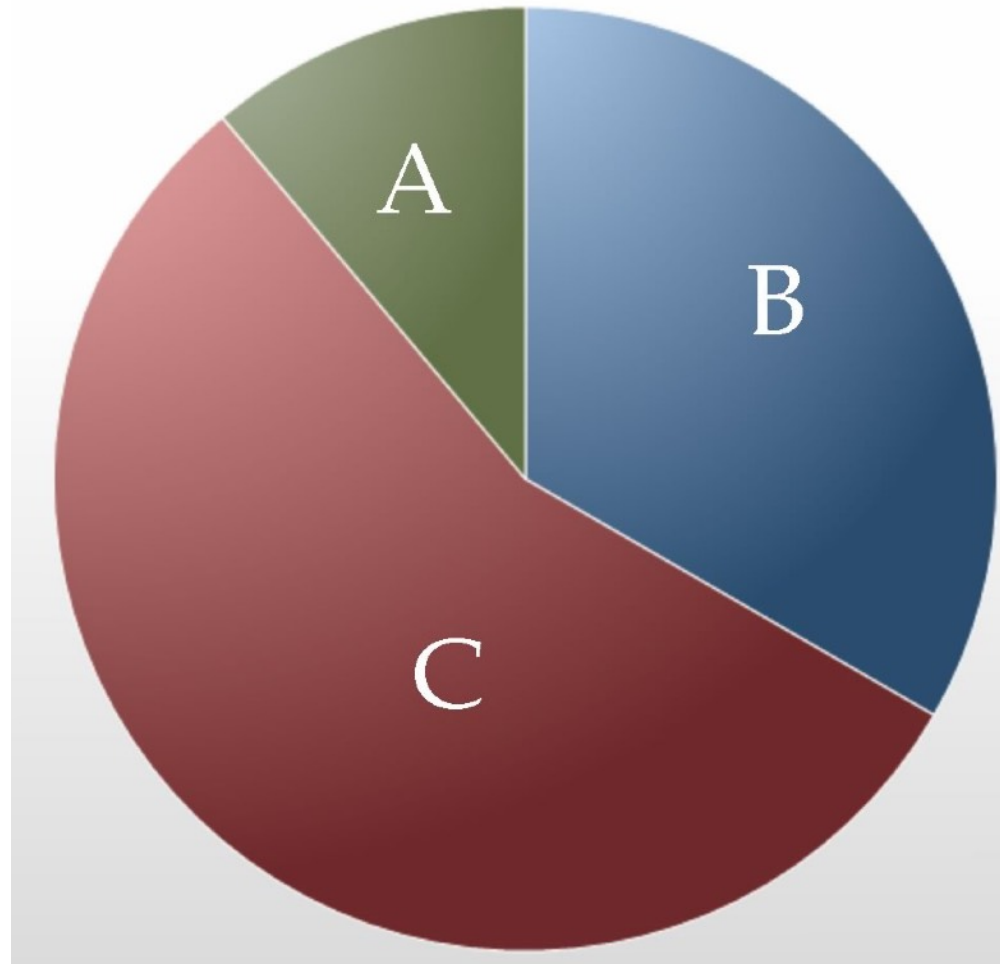
How might mutations in the genes encoding the clamp/clamp-loader system influence DNA replication?

Mutations DNA occur, how are they recognized?

- ☐ there are proteins that know what the right sequence should be
- ☐ they change the structure of the DNA molecule
- ☐ they encode non-functional gene products
- ☐ no idea

What does it mean to be recognized?

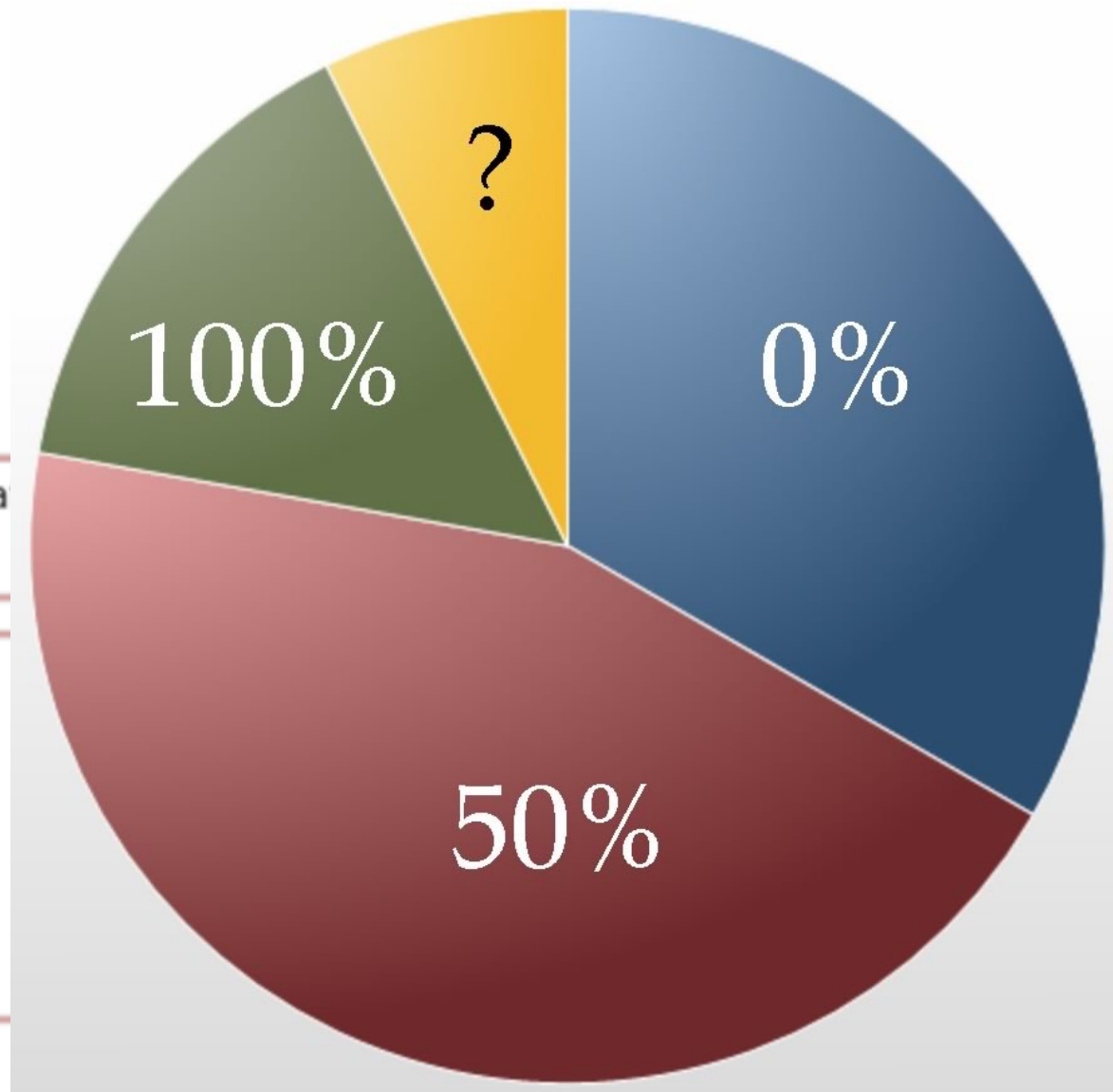
Why are A and C wrong?



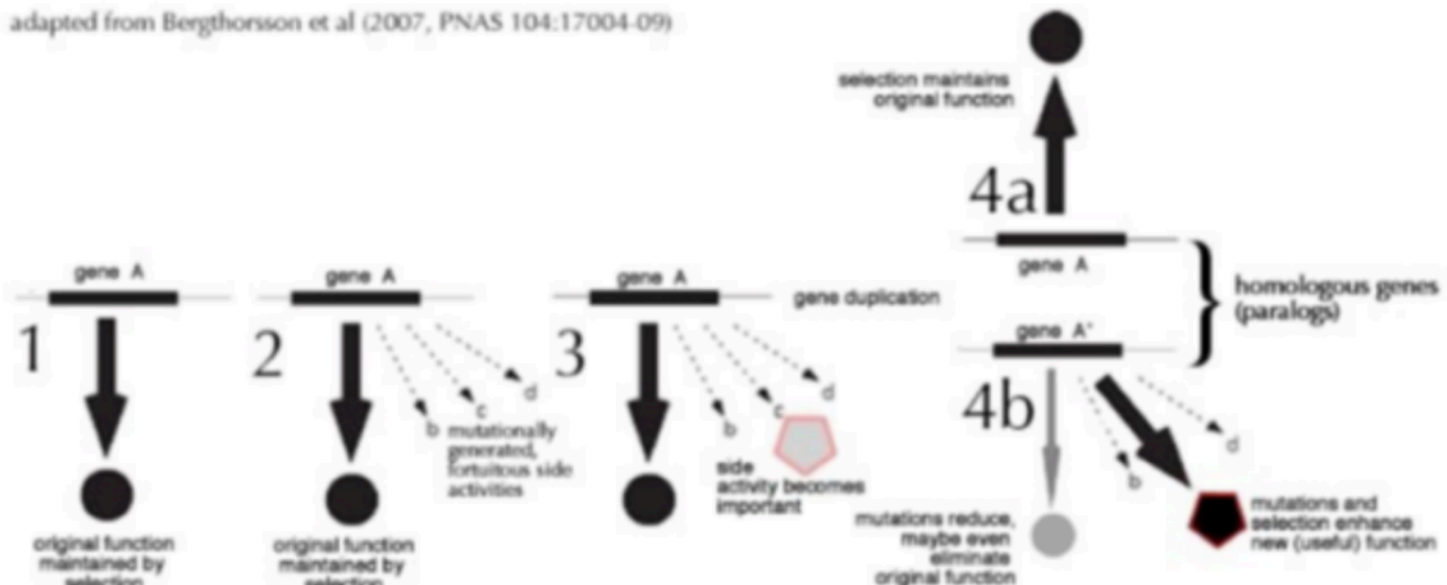
During DNA replication mistakes can be made; if they were repaired randomly, what would be the probability that they would be repaired correctly

- ☐ 0%
- ☐ 50%
- ☐ 100%
- ☐ no idea

How might you influence the rate of DNA replication?



What is the advantage of duplicating genes, as opposed to developing new genetic activities de novo.



If you had to speculate, how would a repeat diseaase lead to changes in gene product functions?

would the effect be positive, negative, or neutral?

