Shunyu Wu

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Questions: DNA Replication

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1) Discontinuous replication is a result of which property of DNA
   a. Complementary bases
   b. Five-carbon sugar
   c. Charged phosphate group
   d. Antiparallel nucleotide strands

2) Where on the lagging strand are primers synthesized?
   a. Only at the 5' end of the newly synthesized strand
   b. At the beginning of every Okazaki fragment
   c. At multiple places within an Okazaki fragment
   d. Only at the 3' end of the newly synthesized strand

3) What would be the effect on DNA replication if the following activity of DNA polymerase I were destroyed by mutation:

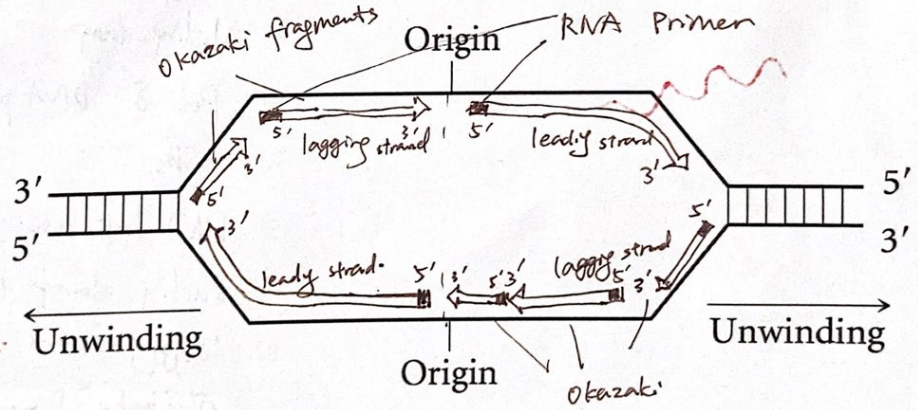
   a. 3' --> 5' exonuclease activity — No proof ready

   b. 5' --> 3' exonuclease activity — No primer removal

   c. 5' --> 3' polymerase activity — last nucleotide of the primer would not be removed, hence no finishing up of No gap filling replication, small gap

   primers would not be replaced, big gap.

4) The following diagram represents a DNA molecule that is undergoing replication. Draw in the strands of newly synthesized DNA and identify (a) the polarity of newly synthesized strands, (b) the leading and lagging strands, (c) Okazaki fragments, and (d) RNA primers.



5) Phosphorus is required to synthesize the deoxyribonucleoside triphosphates used in DNA replication. Peter Handrix grows some *E. coli* in a medium containing nonradioactive phosphorous for many generations. A sample of the bacteria is then transferred to a medium that contains a radioactive isotope of phosphorous (^{32}P). He removes one sample of the bacteria immediately after the transfer, another after one round and a third after two rounds of replication, respectively. What is the distribution of radioactivity? Will it be in none, one or both strands of the DNA?

immediately after: none.

one round: One strand

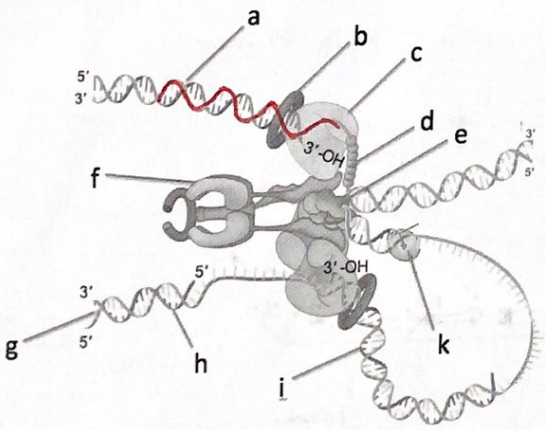
two rounds: 50% of DNA molecules will have one strand contain ^{32}P

50% of DNA have ^{32}P in both strand

6) Suppose a future scientist explores a distant planet and discovers a novel form of double-stranded nucleic acid. When this nucleic acid is exposed to DNA polymerases from *E. coli*, replication takes place continuously on both strands. What conclusion can you make about the structure of this novel nucleic acid?

Both strands on the nucleic acid must be oriented in the same direction

7) Label the following drawing



a) leading strand ~~template~~
b) sliding clamp
c) Pol δ DNA polymerase III
d) SSBs
e) DNA helicase
f) sliding clamp loader
g) lagging-strand ~~template~~.
h) RNA primer
j) okazaki fragment
k) primase