

In the name of the most high

# Introduction to Bioinformatics

# DNA

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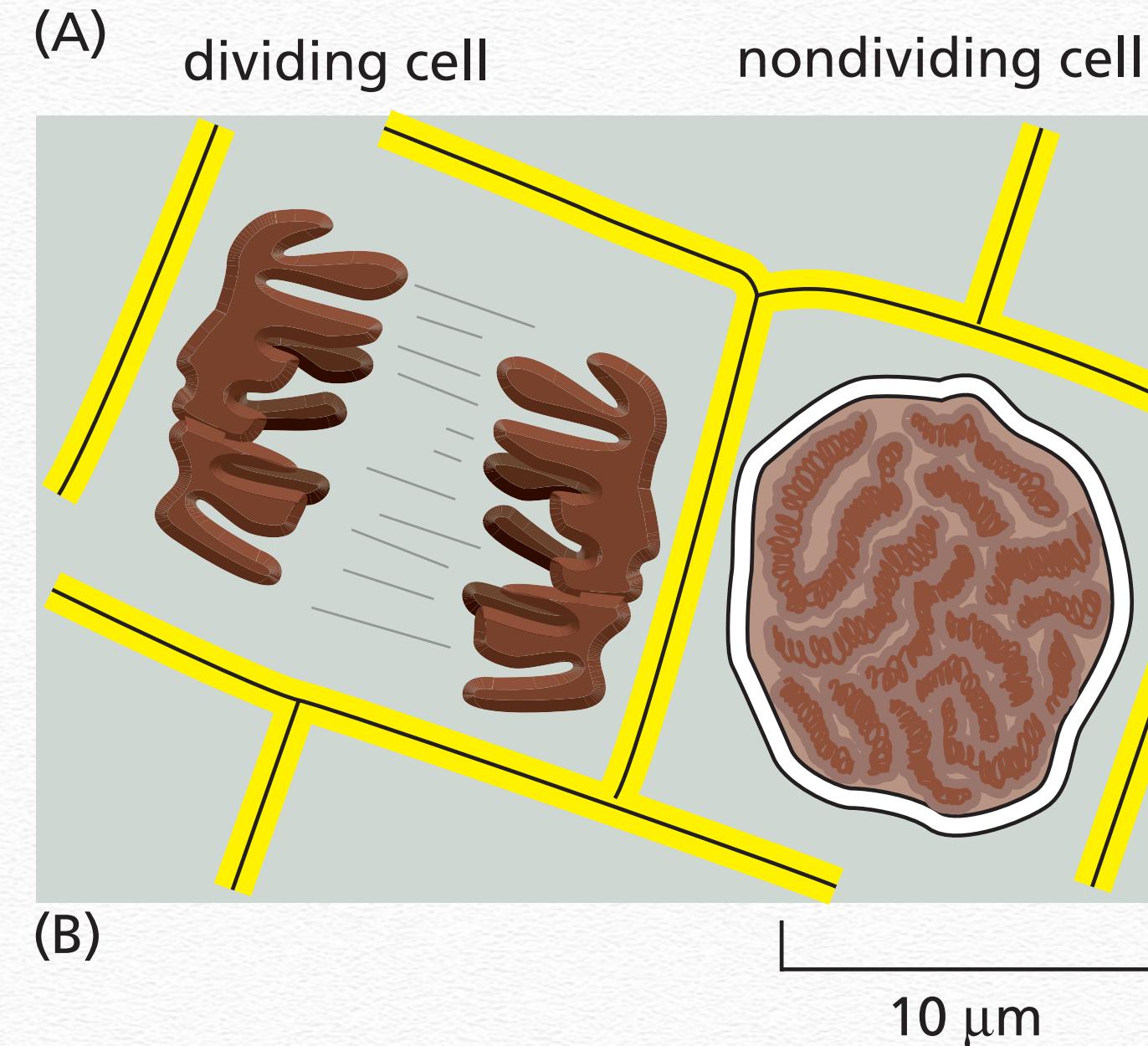
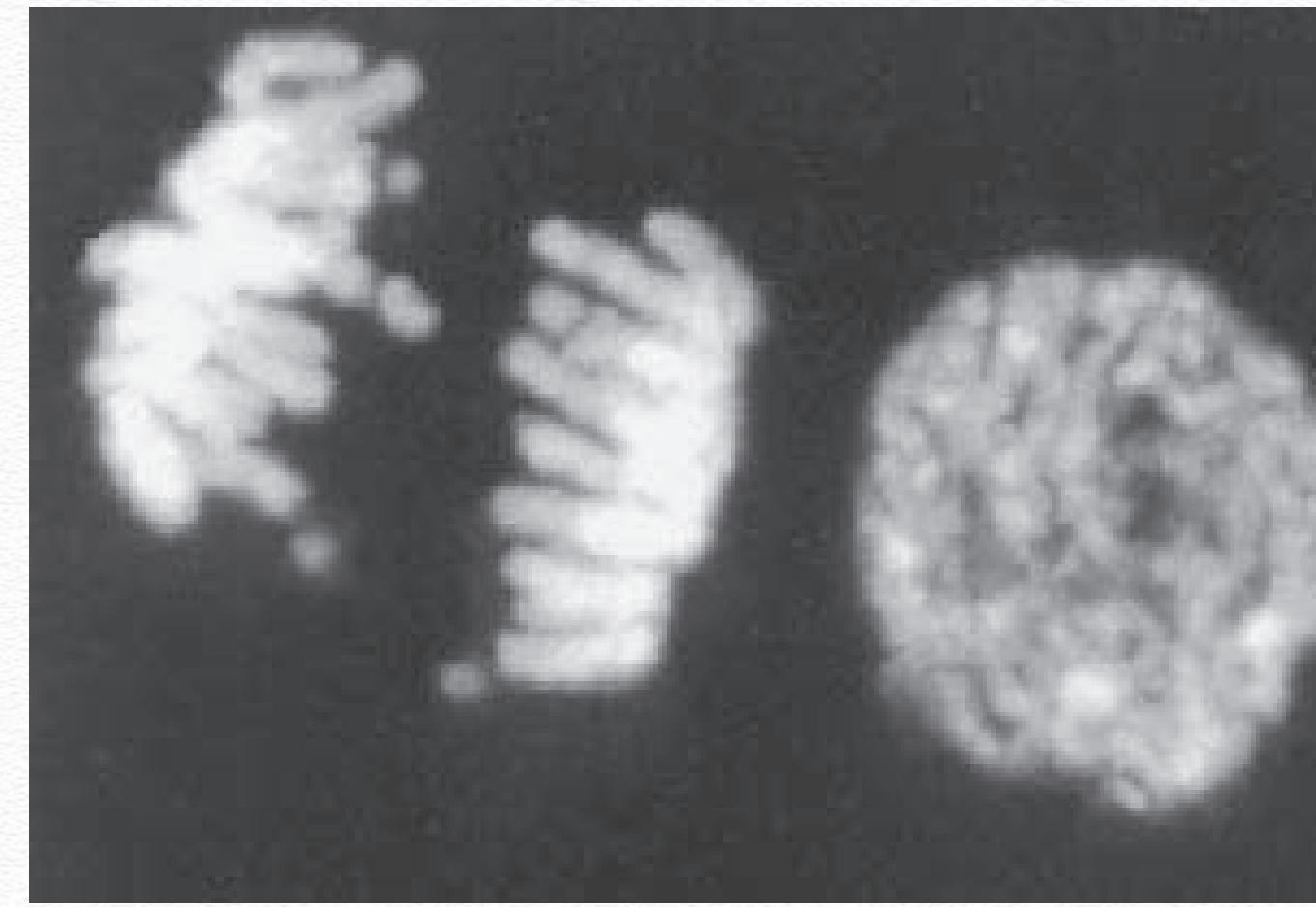
The contents including images and videos are from Bruce Alberts et al. Essential Cell Biology,  
unless indicated separately.

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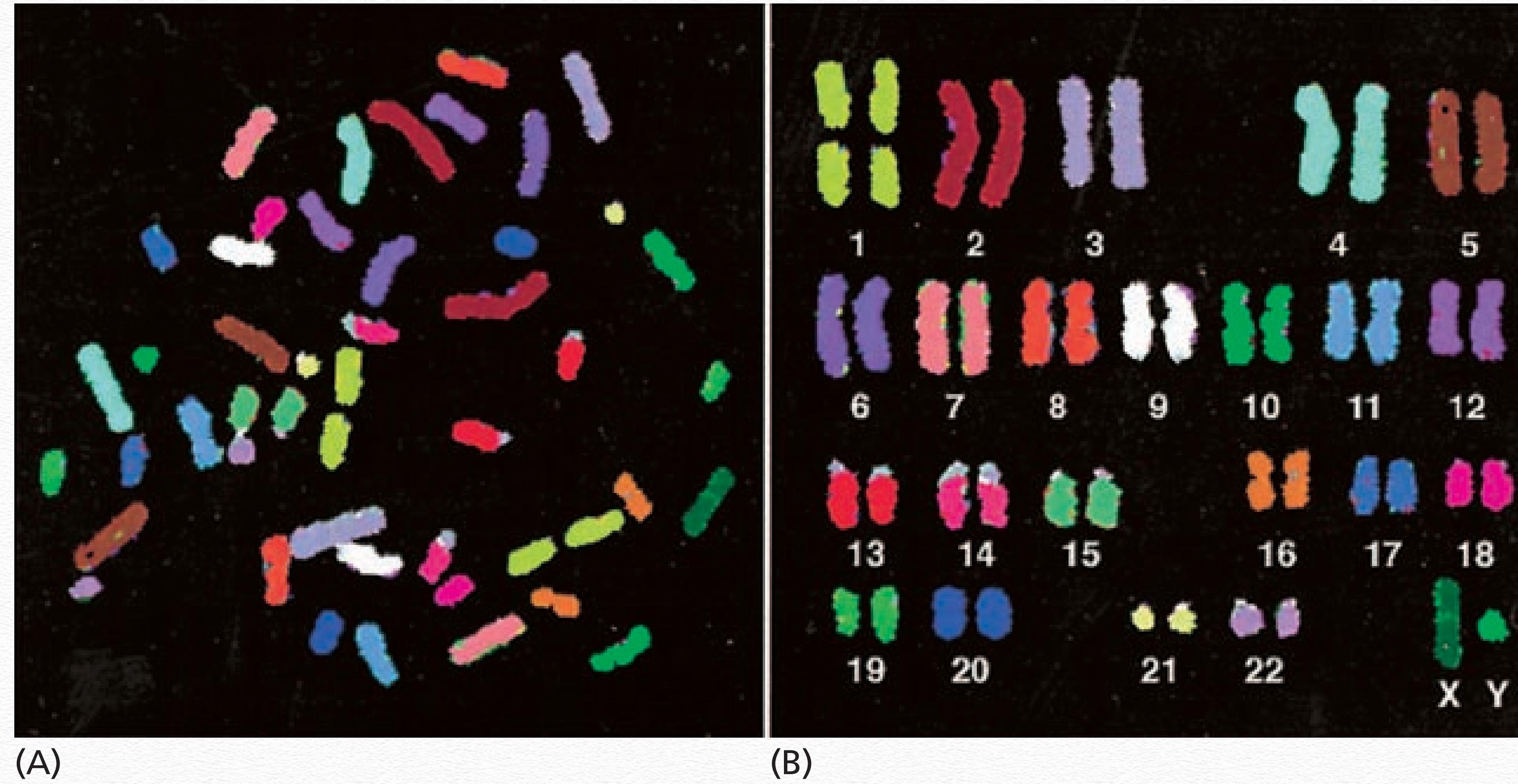
# DNA

## The Language of Life

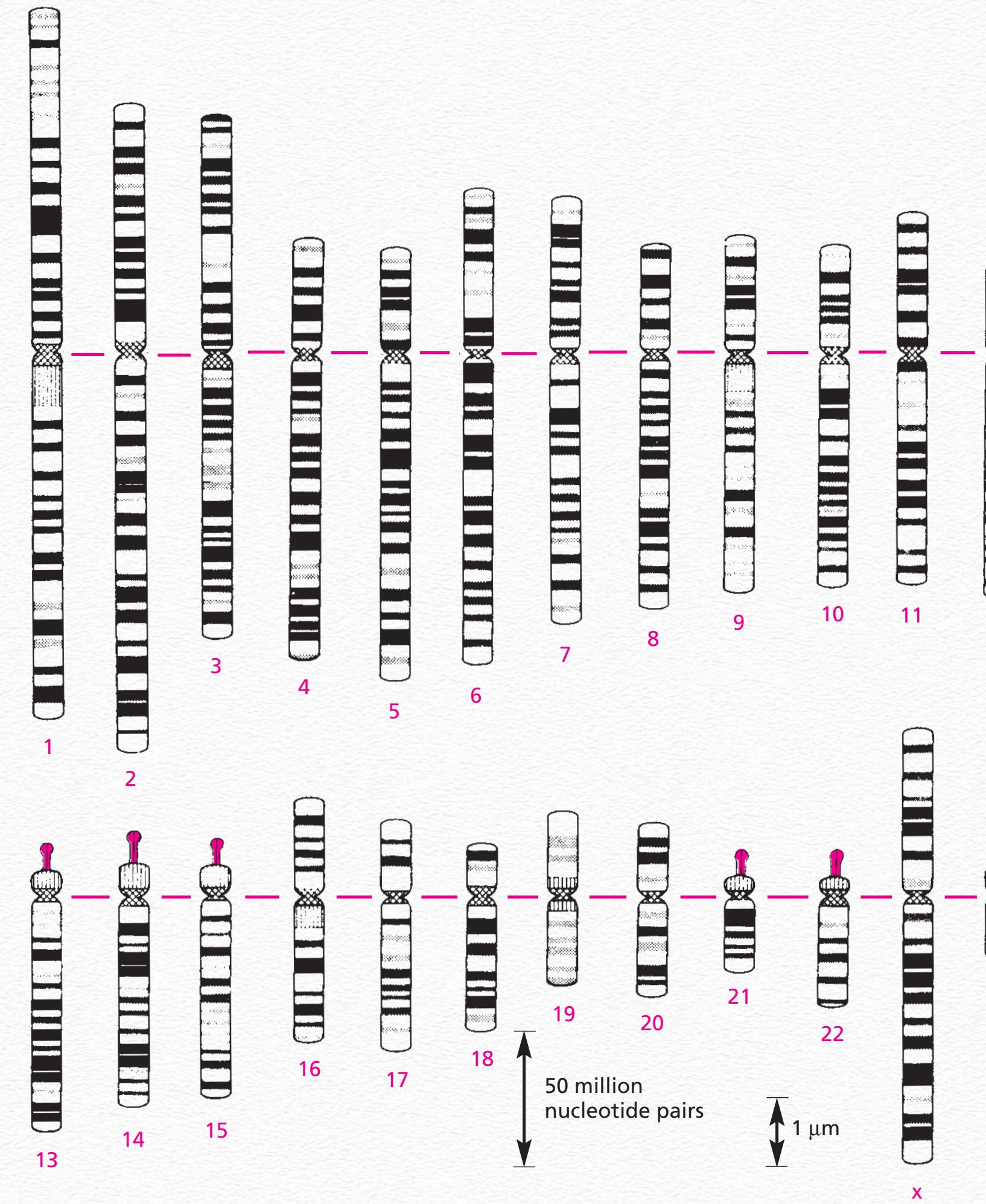
# Nucleus



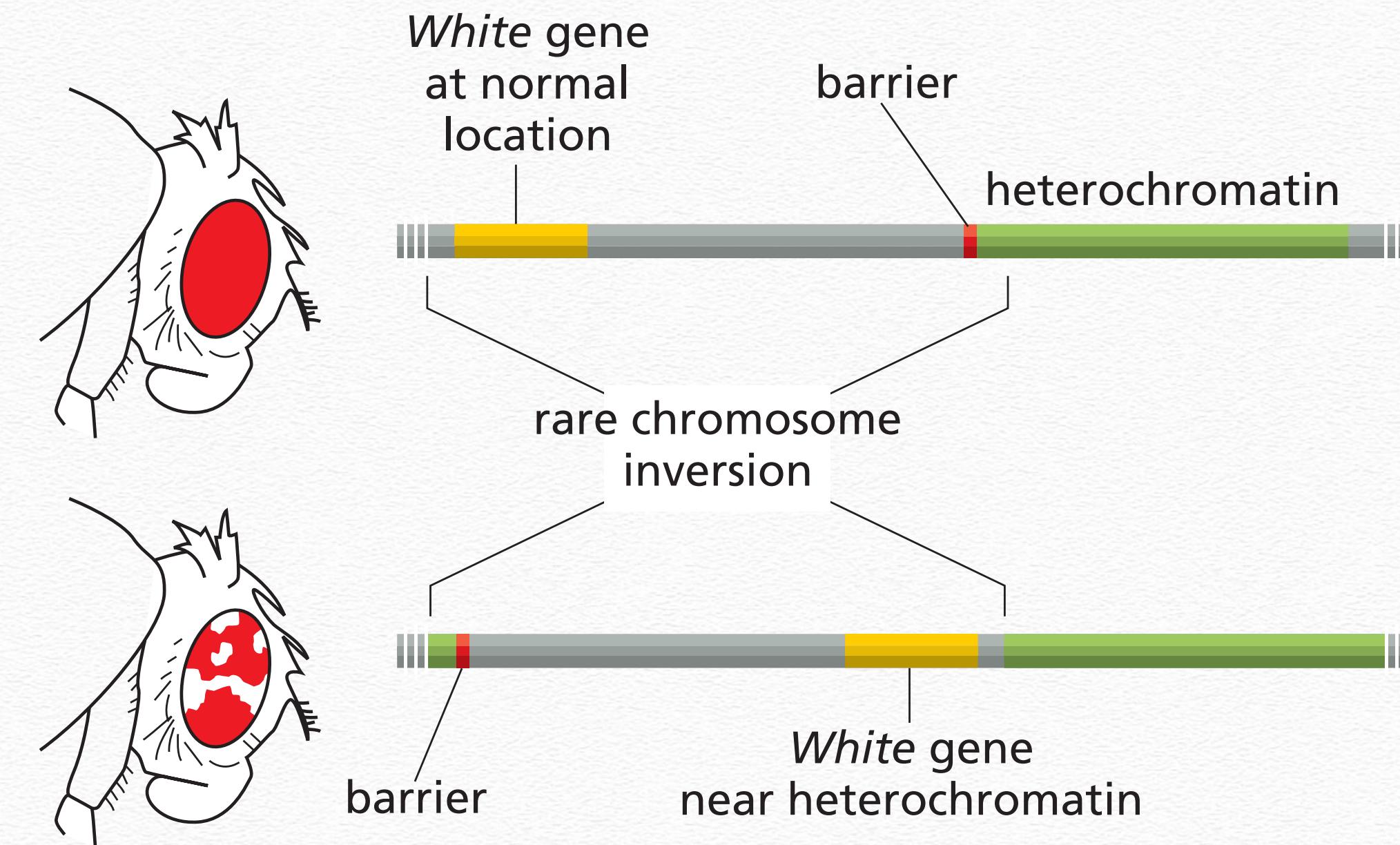
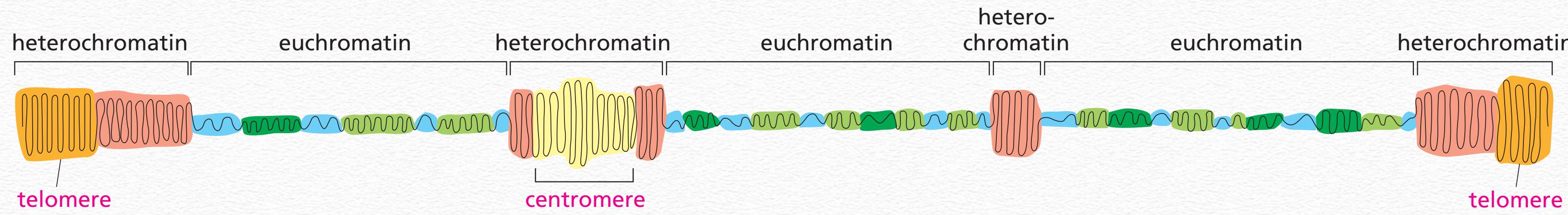
# Chromosomes



# Chromosomes



# Heterochromatin and Euchromatin



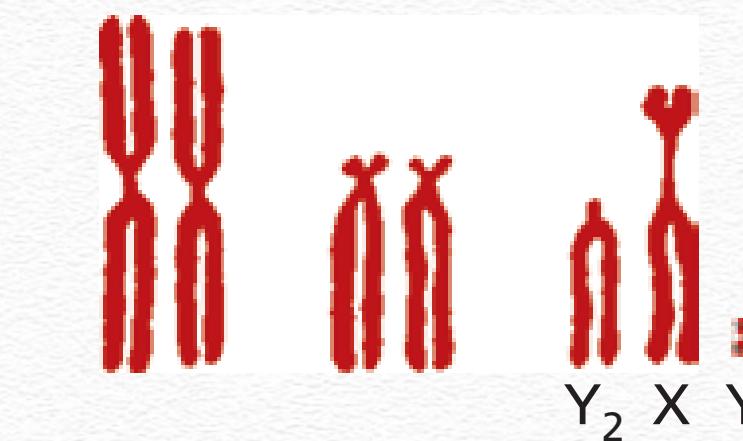
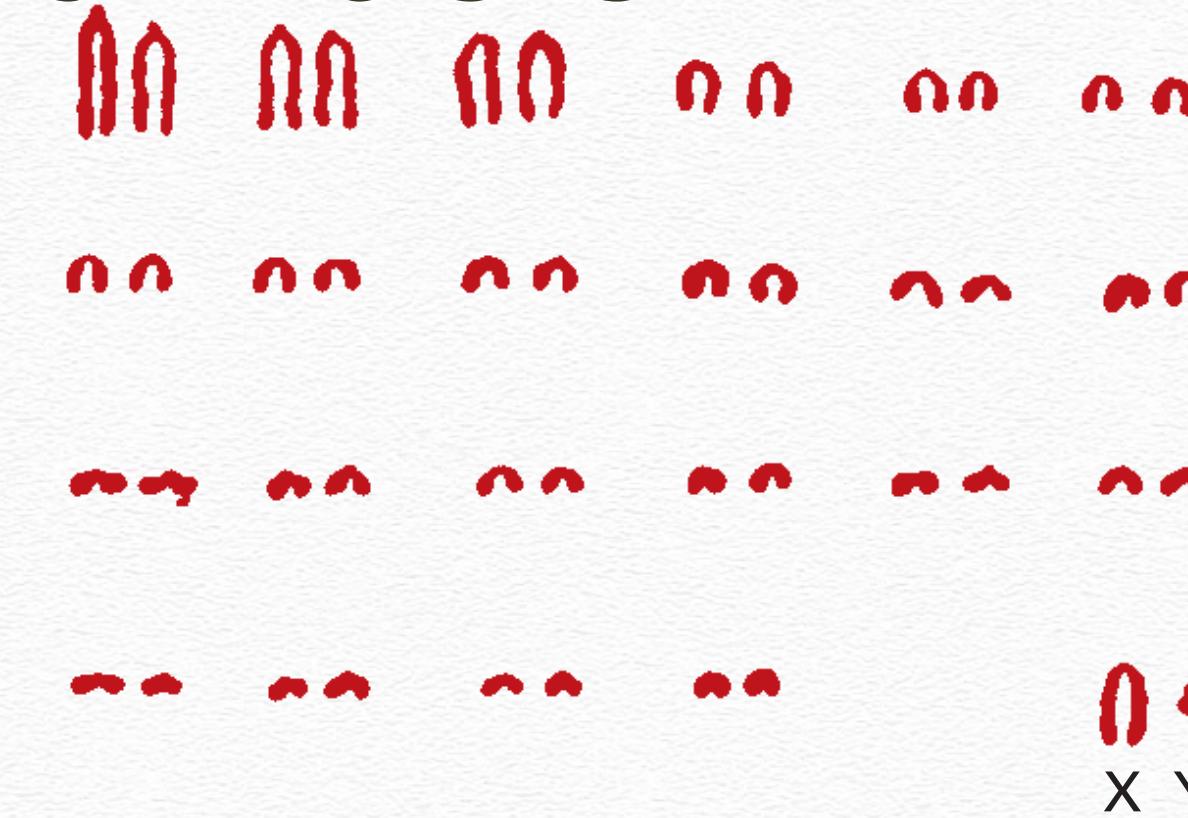
# Close Animals can have different Chromosome Numbers



Chinese muntjac



Indian muntjac

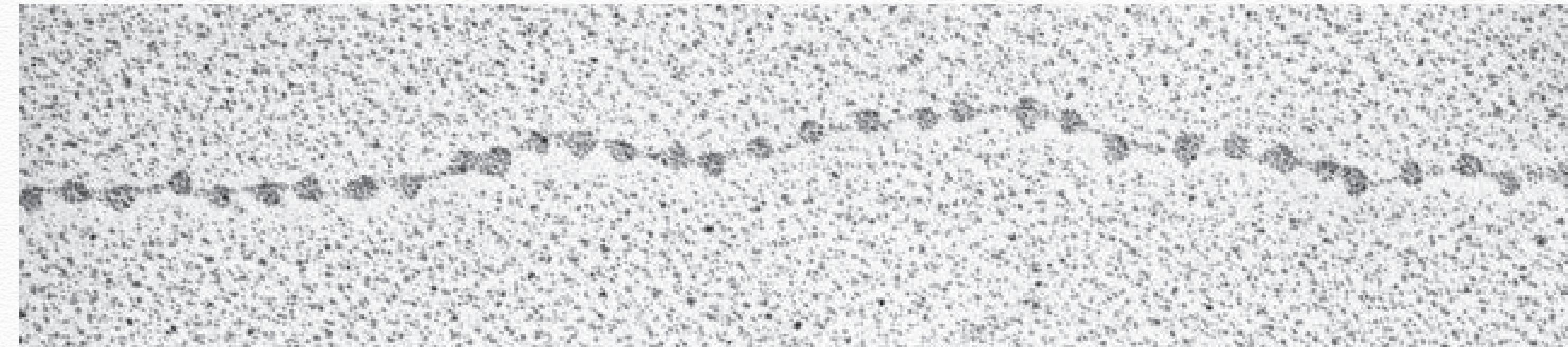


# Nucleosomes

(A)

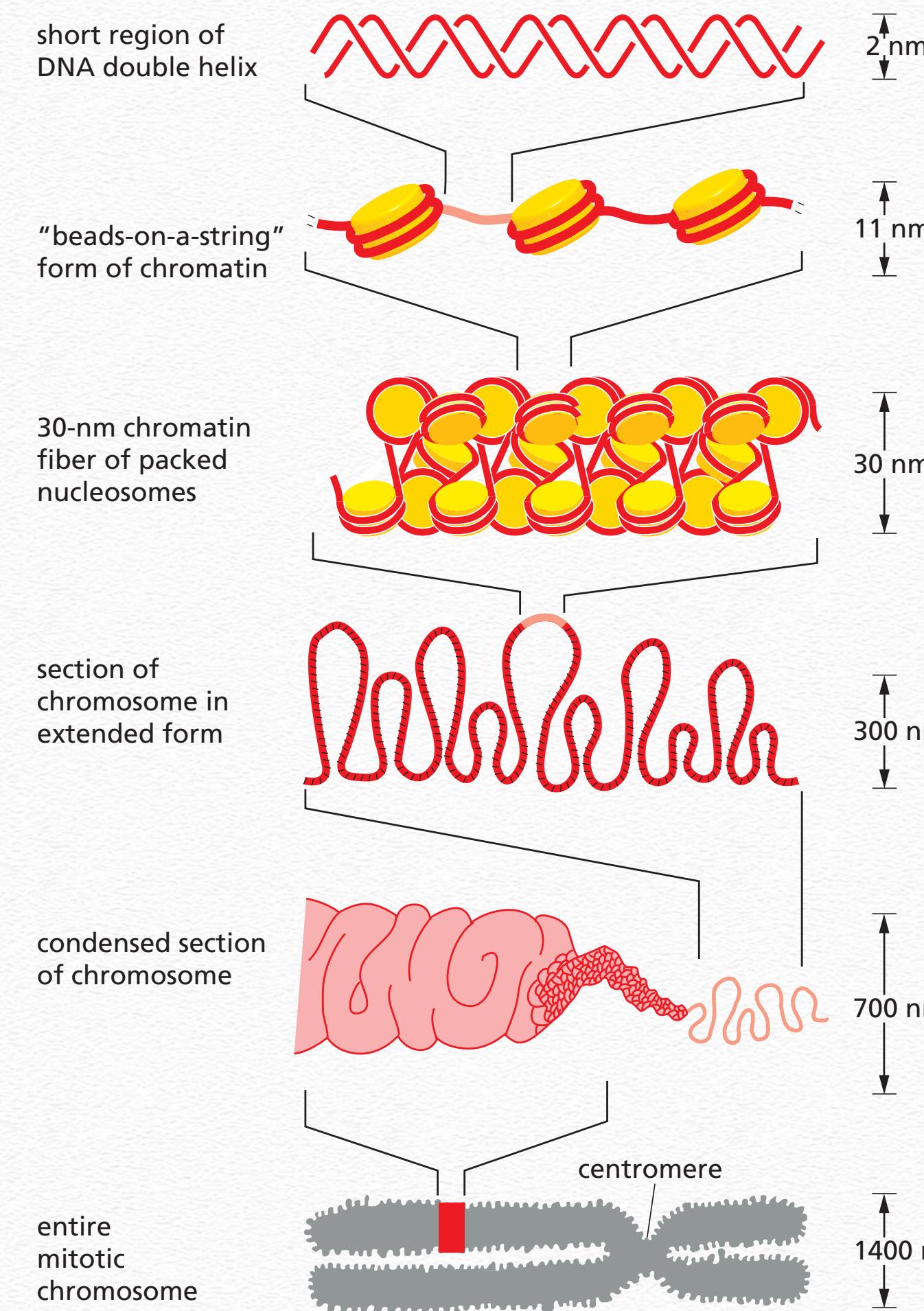


(B)



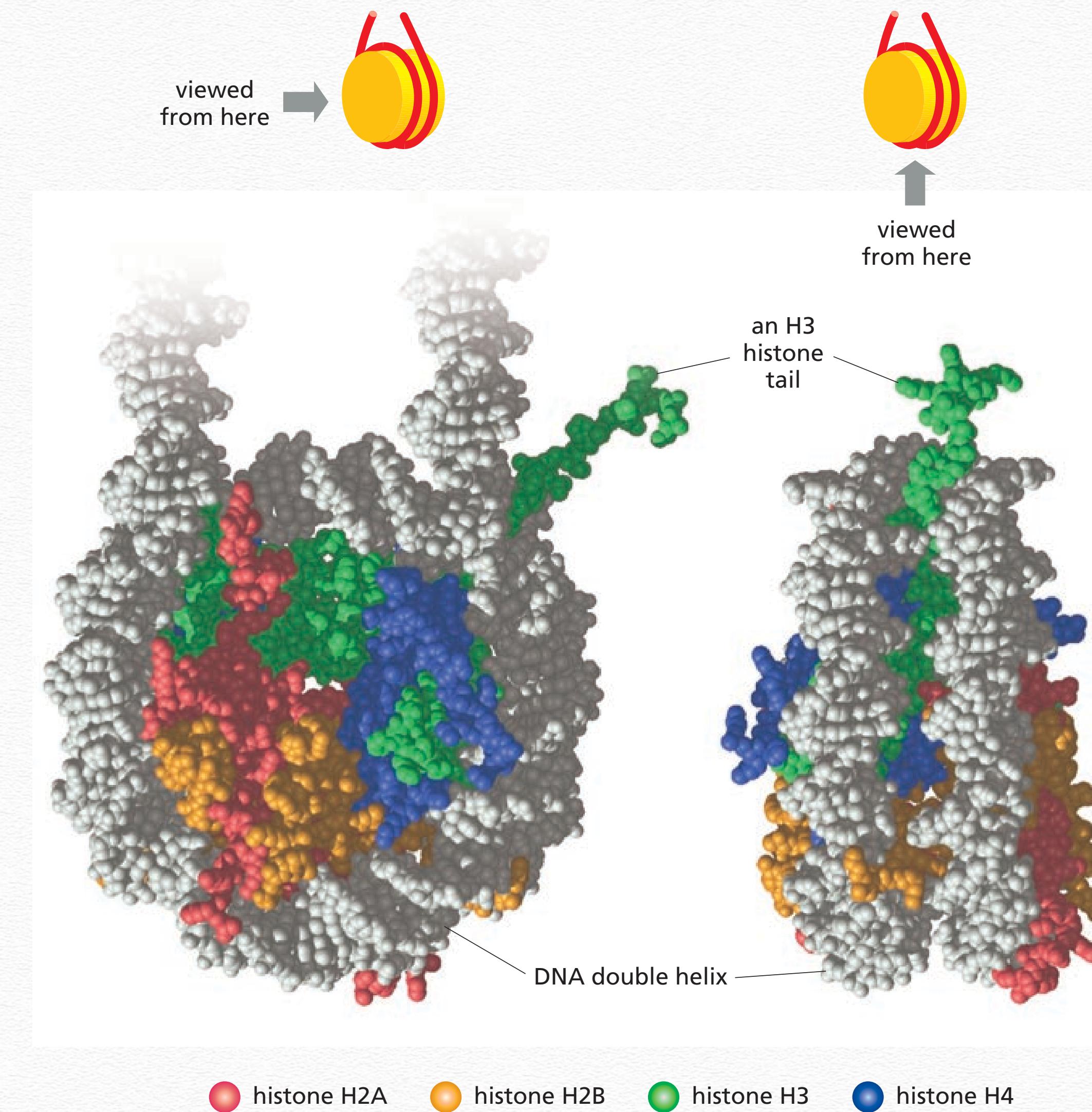
50 nm

# Super-helix Structure of Chromosomes

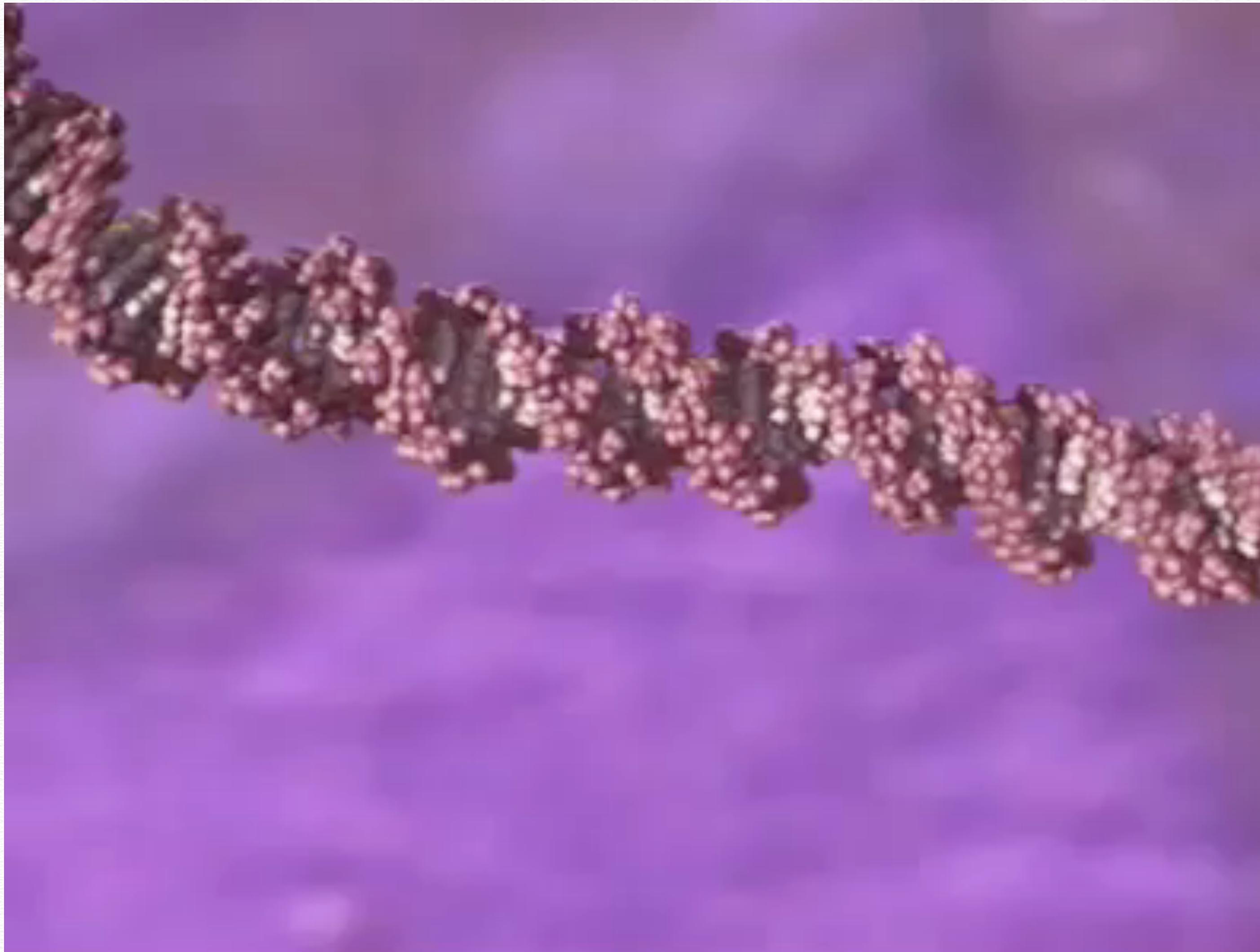


NET RESULT: EACH DNA MOLECULE HAS BEEN  
PACKAGED INTO A MITOTIC CHROMOSOME THAT  
IS 10,000-FOLD SHORTER THAN ITS EXTENDED LENGTH

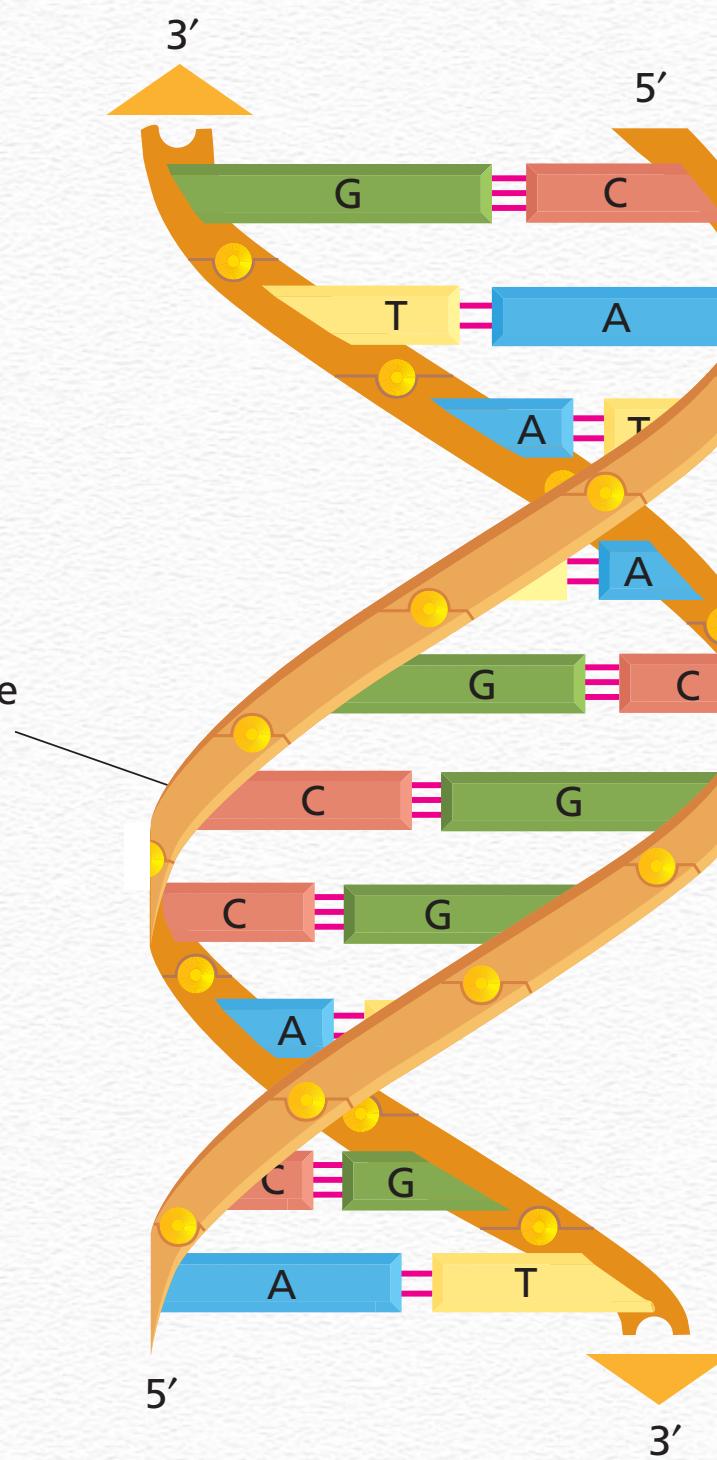
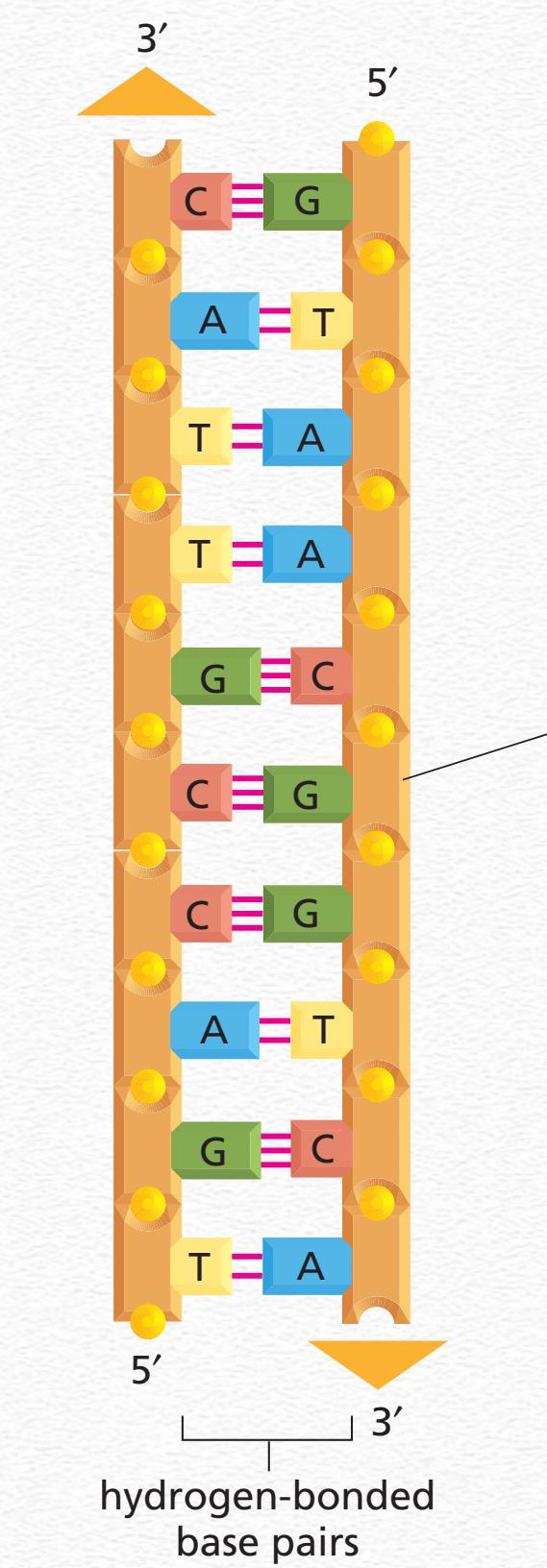
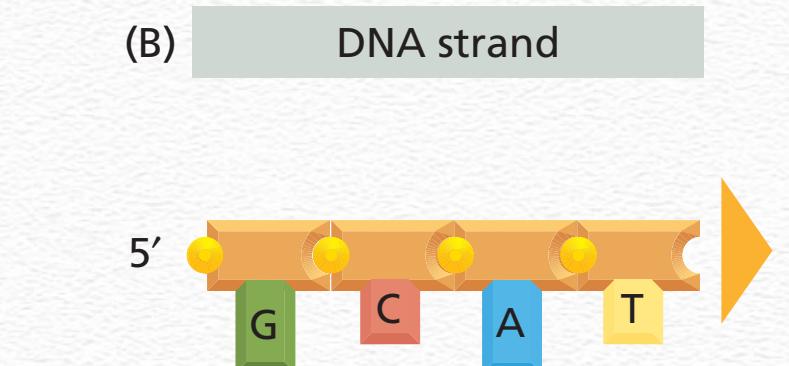
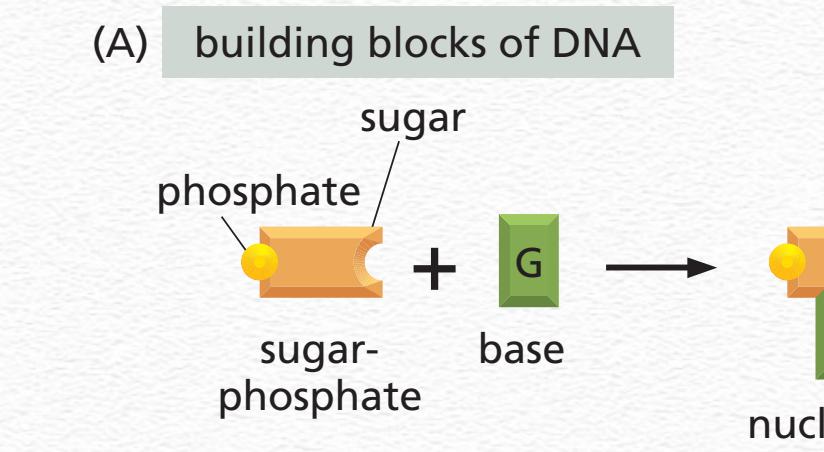
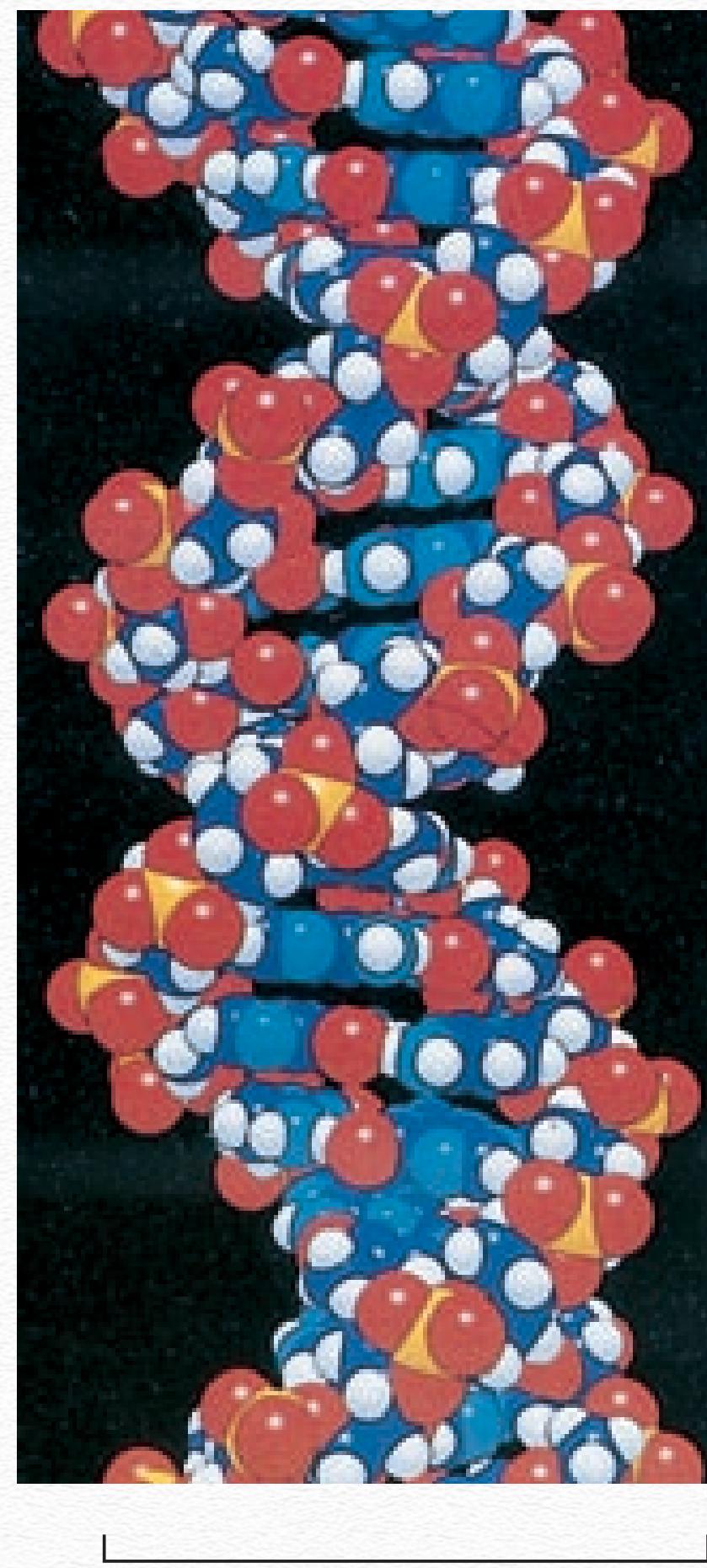
# Histone Proteins



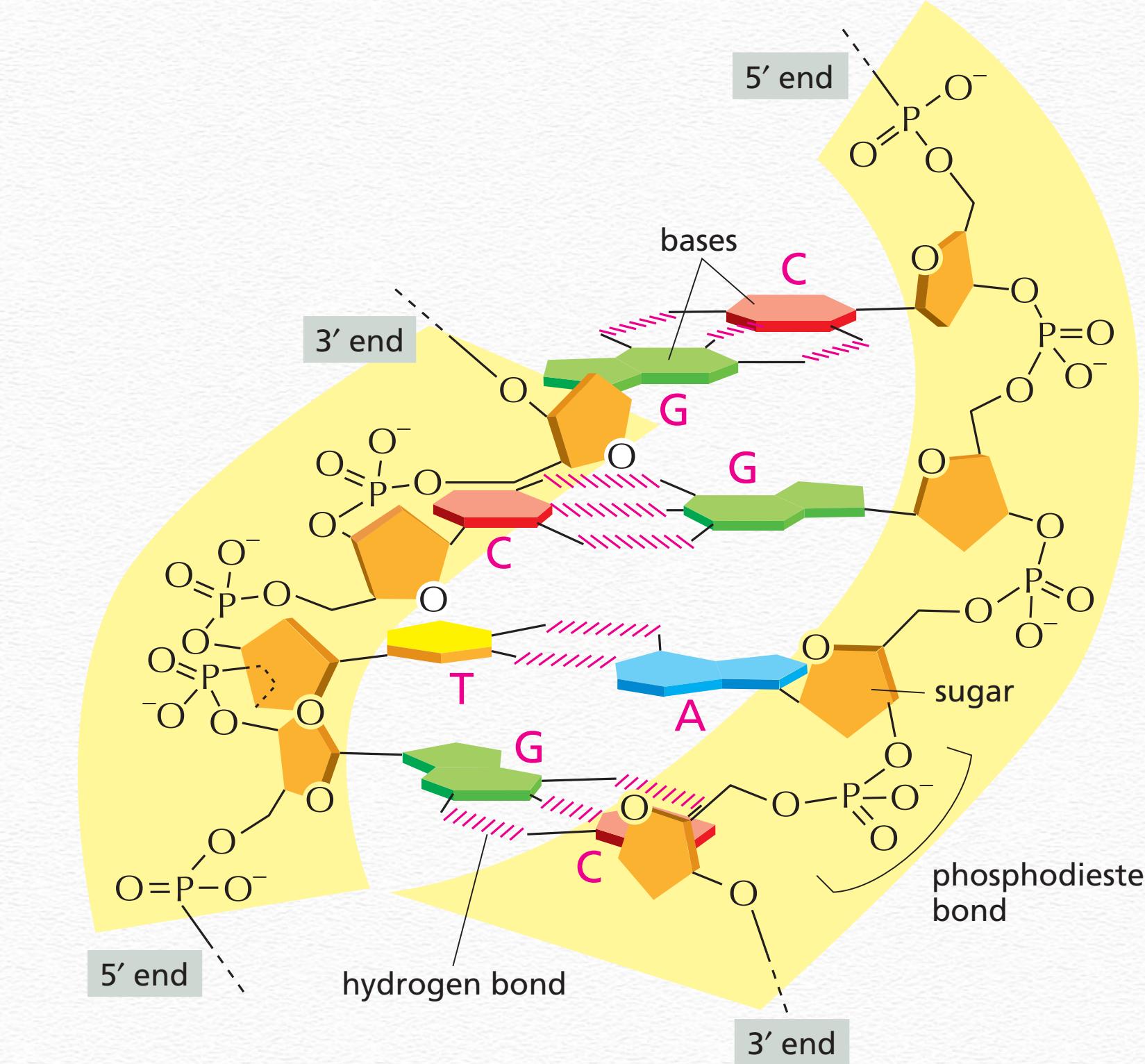
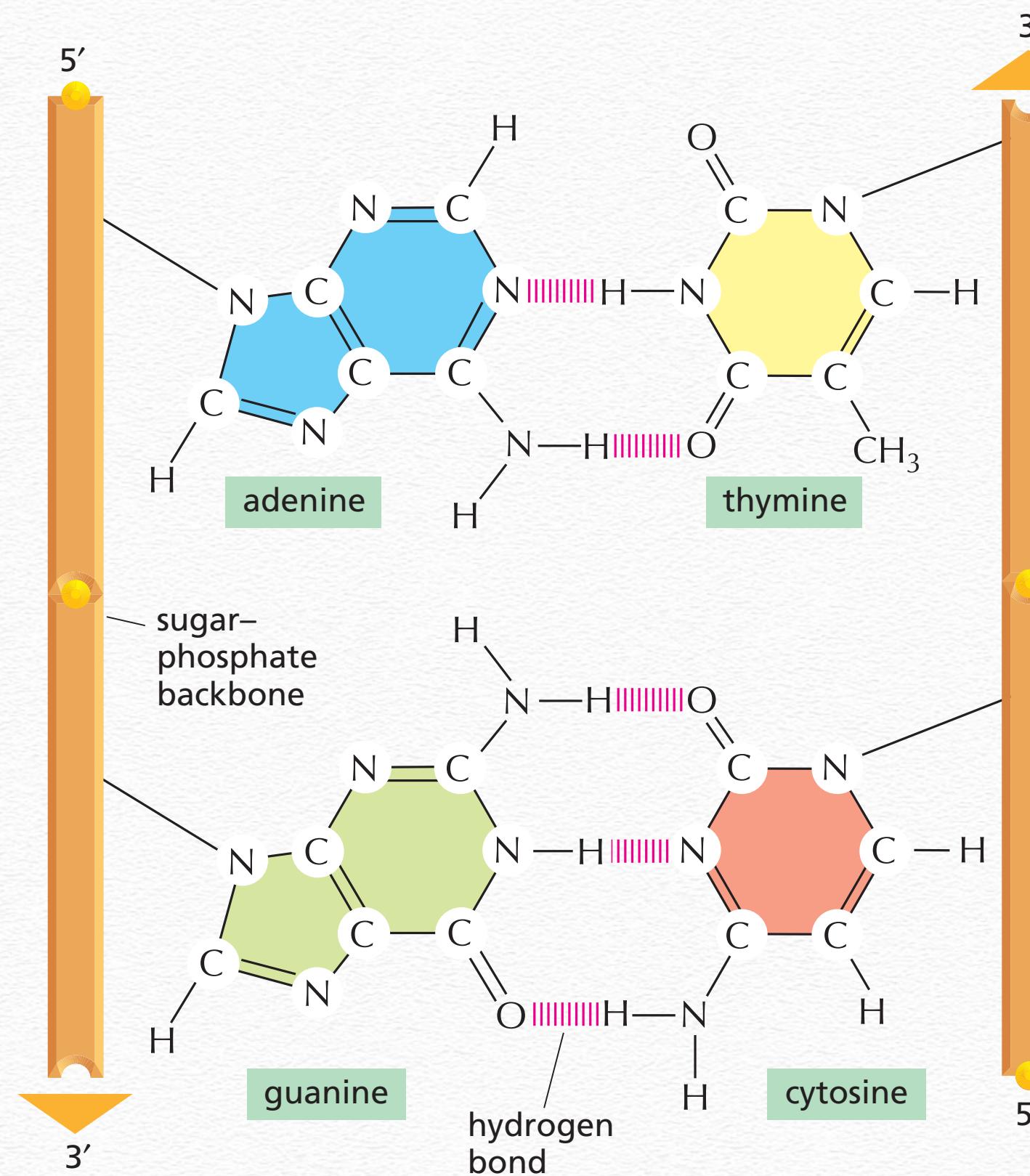
# Chromosome Coiling



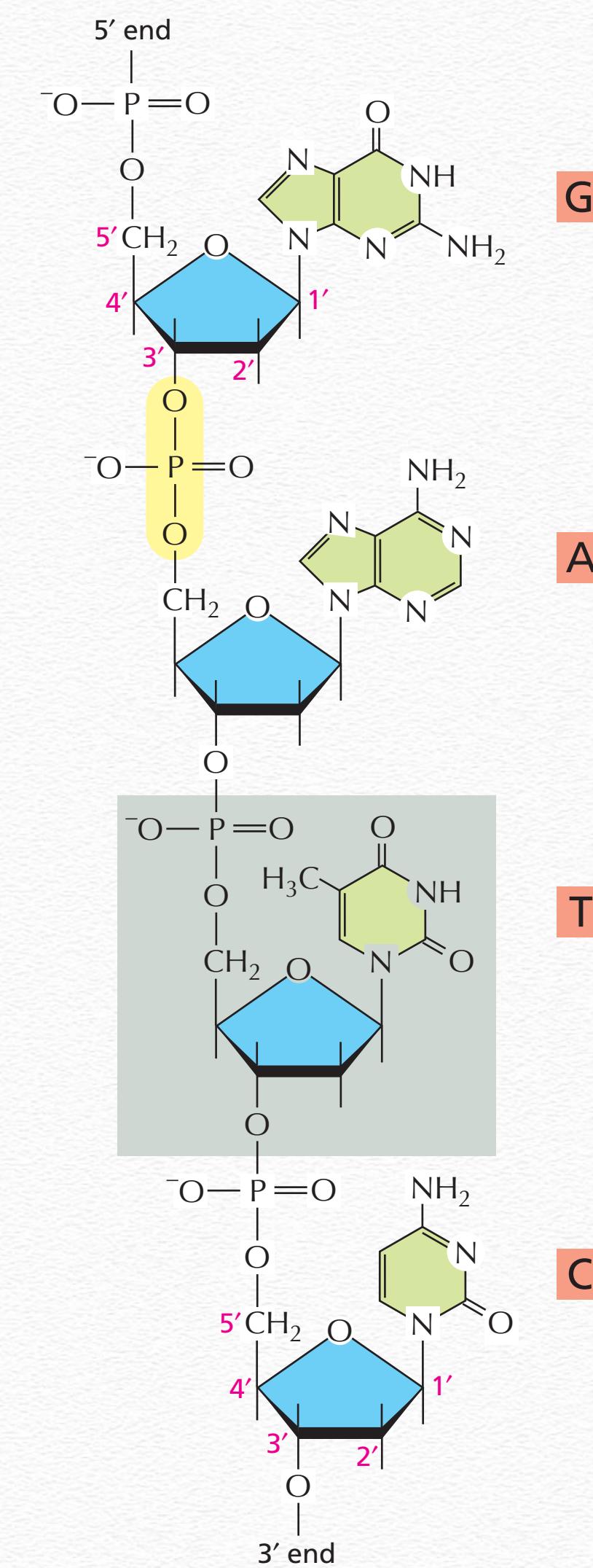
# DNA



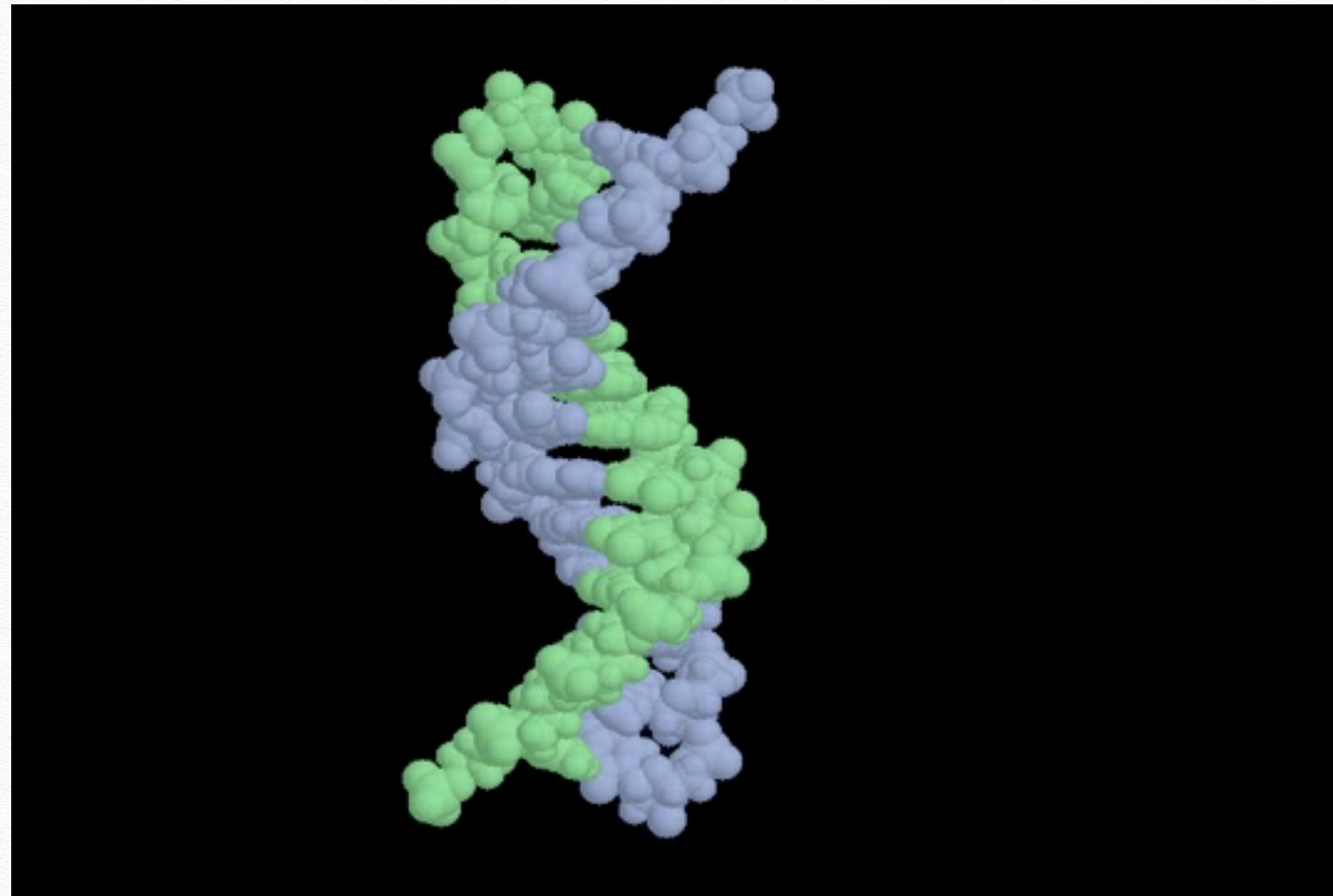
# DNA Structure



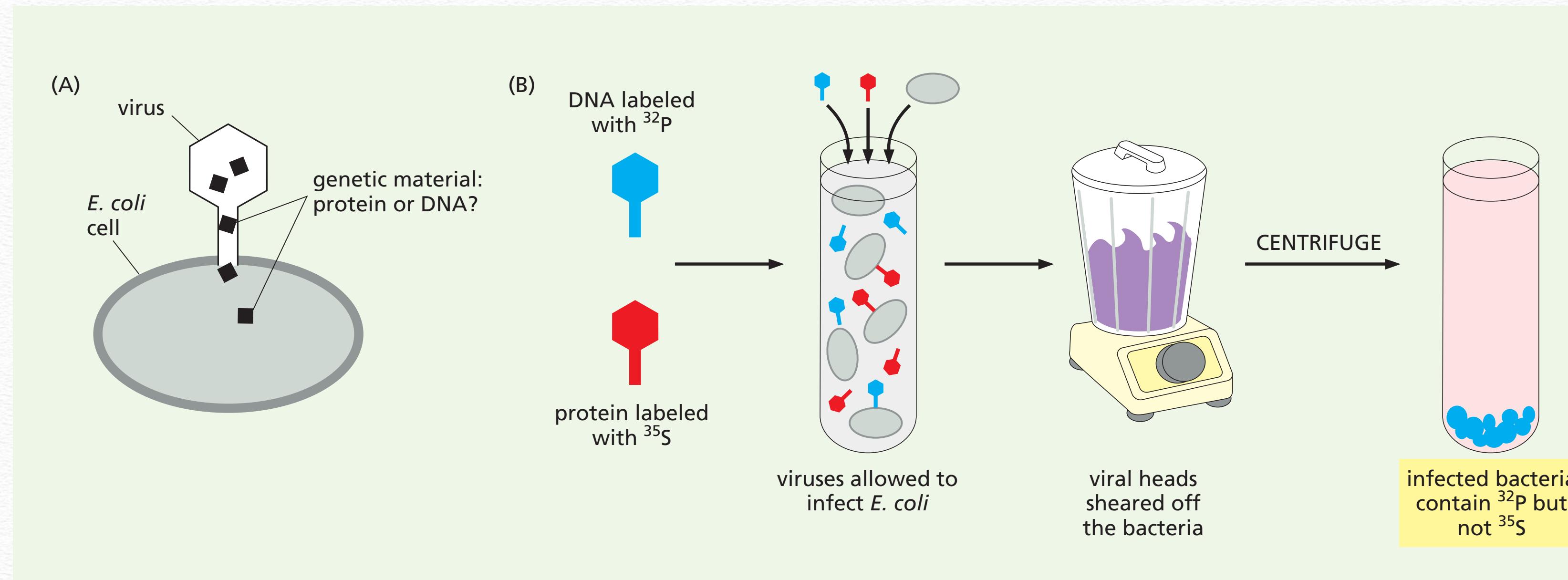
5', 3'



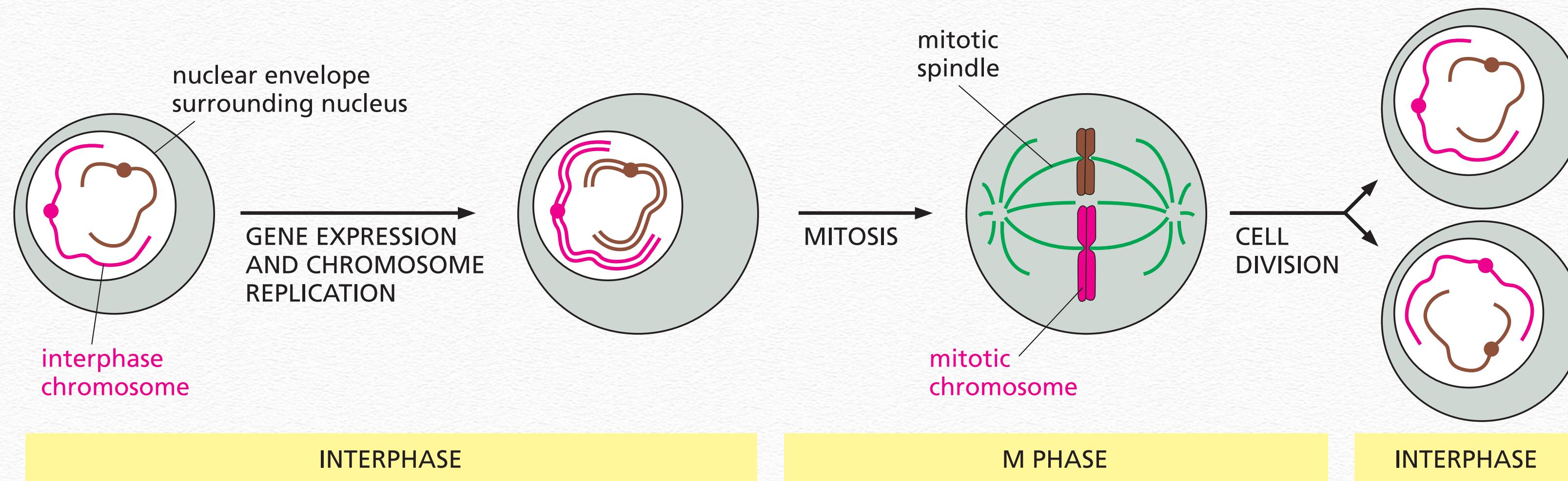
# DNA Structure



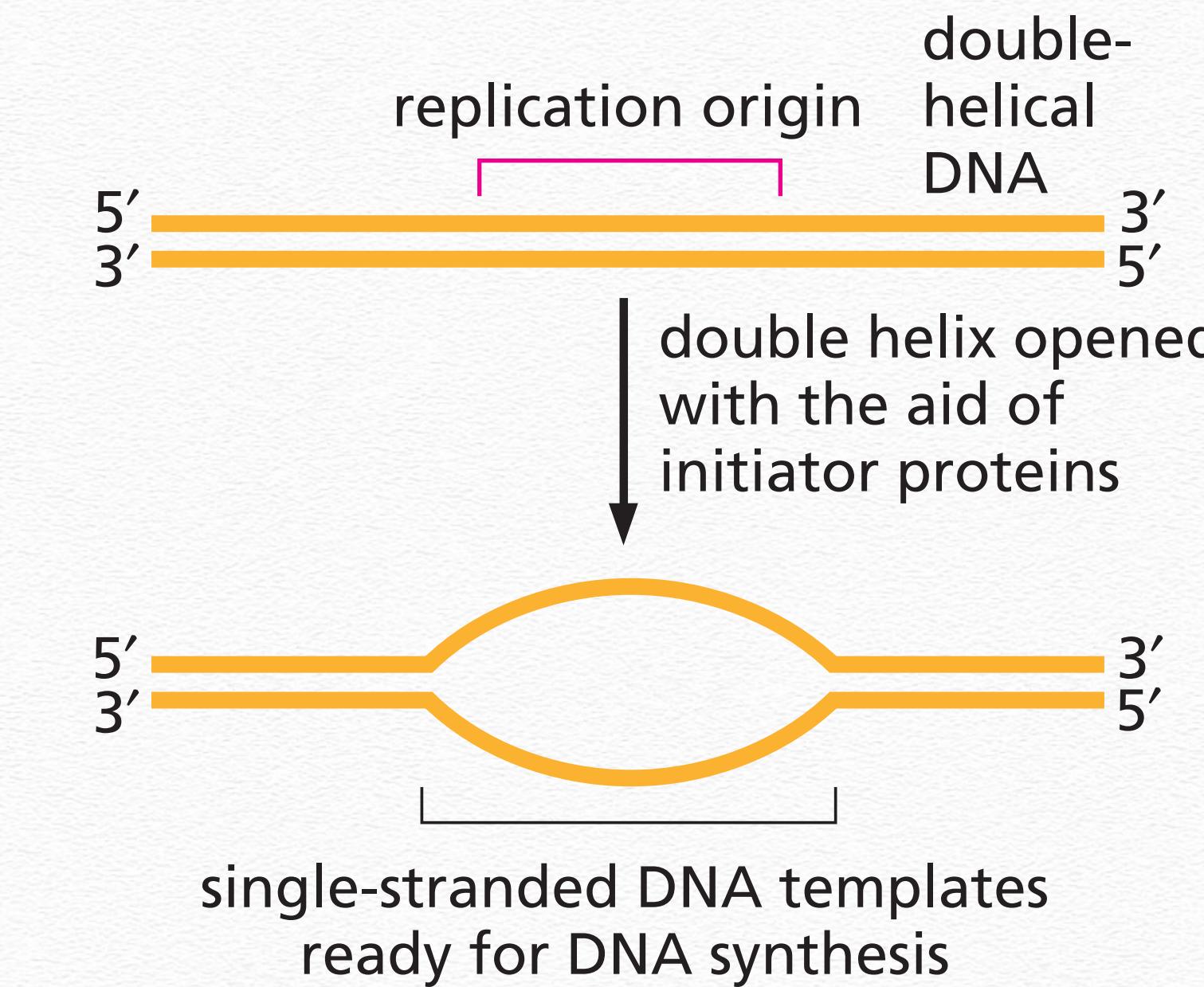
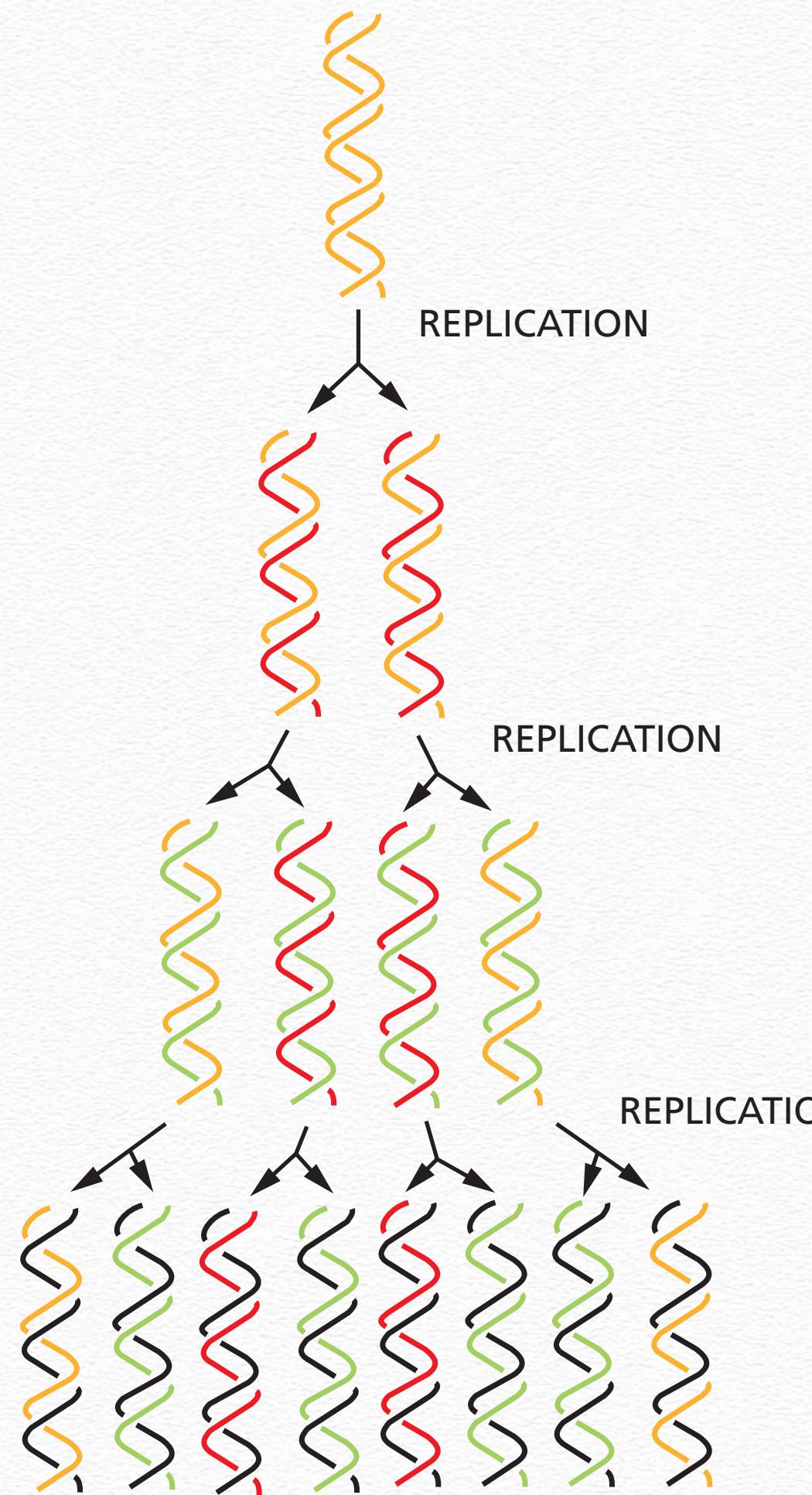
# What is the genetic material?



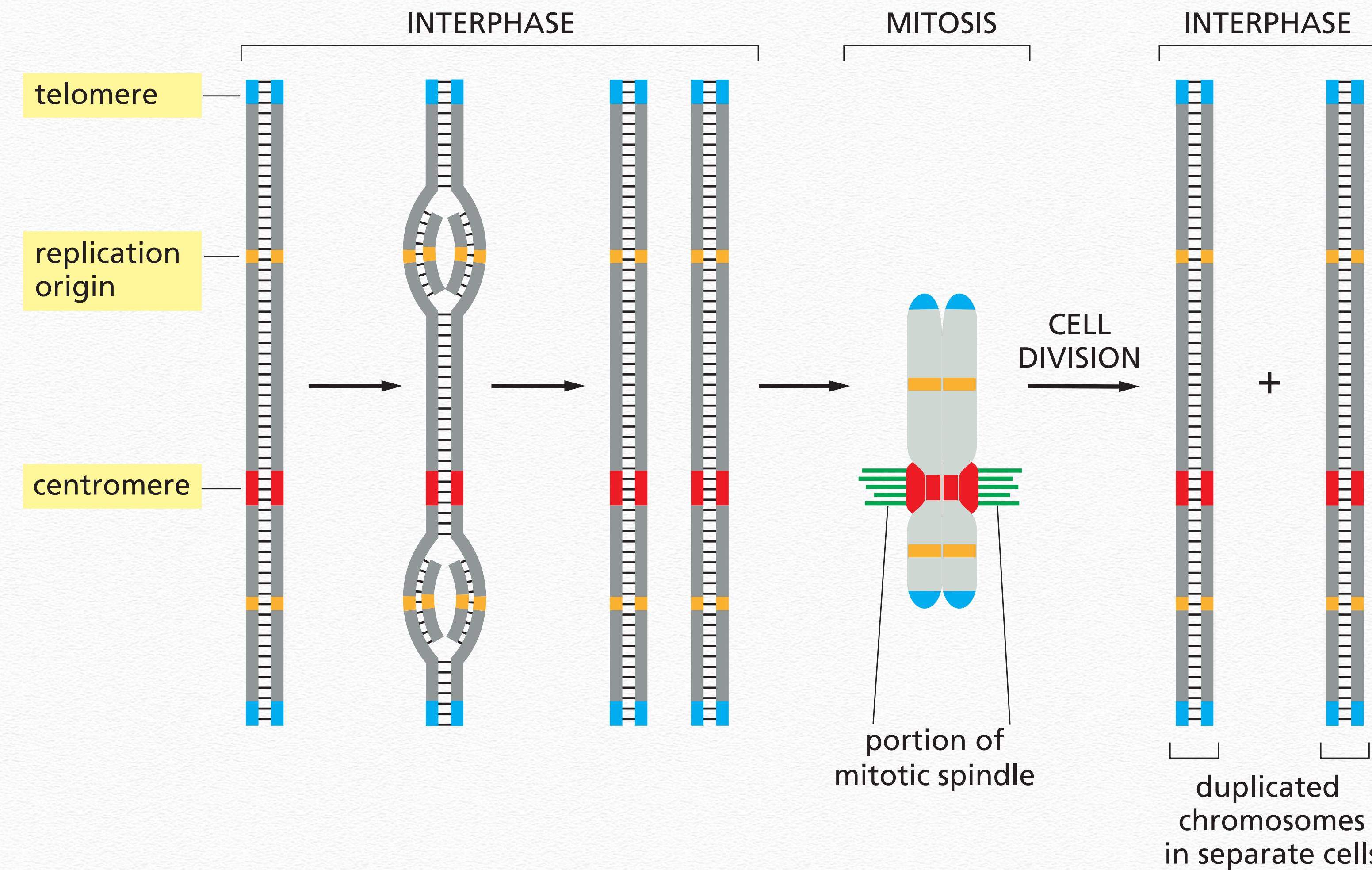
# Cell Division



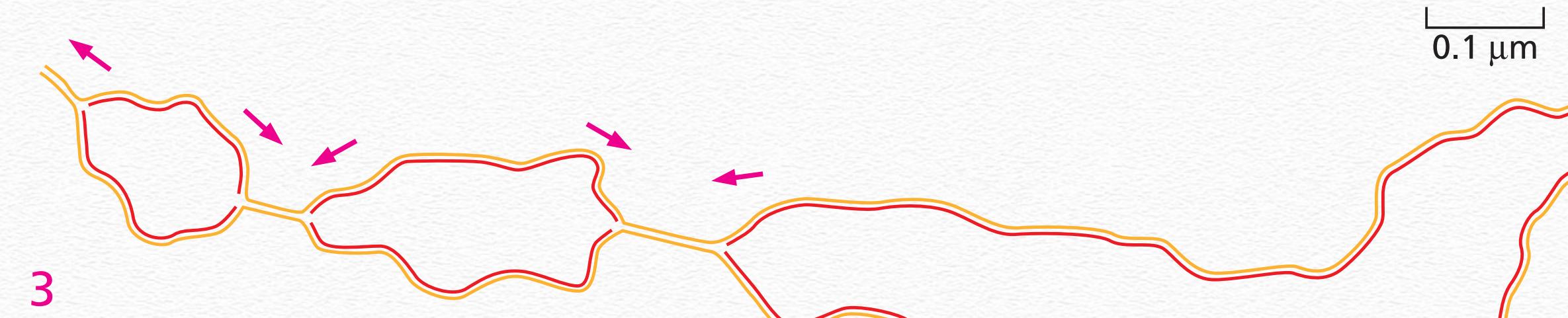
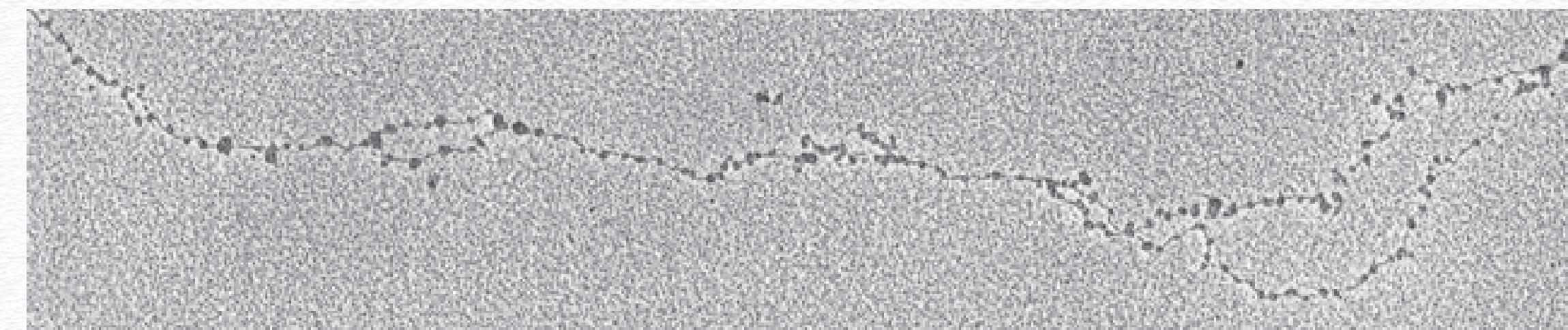
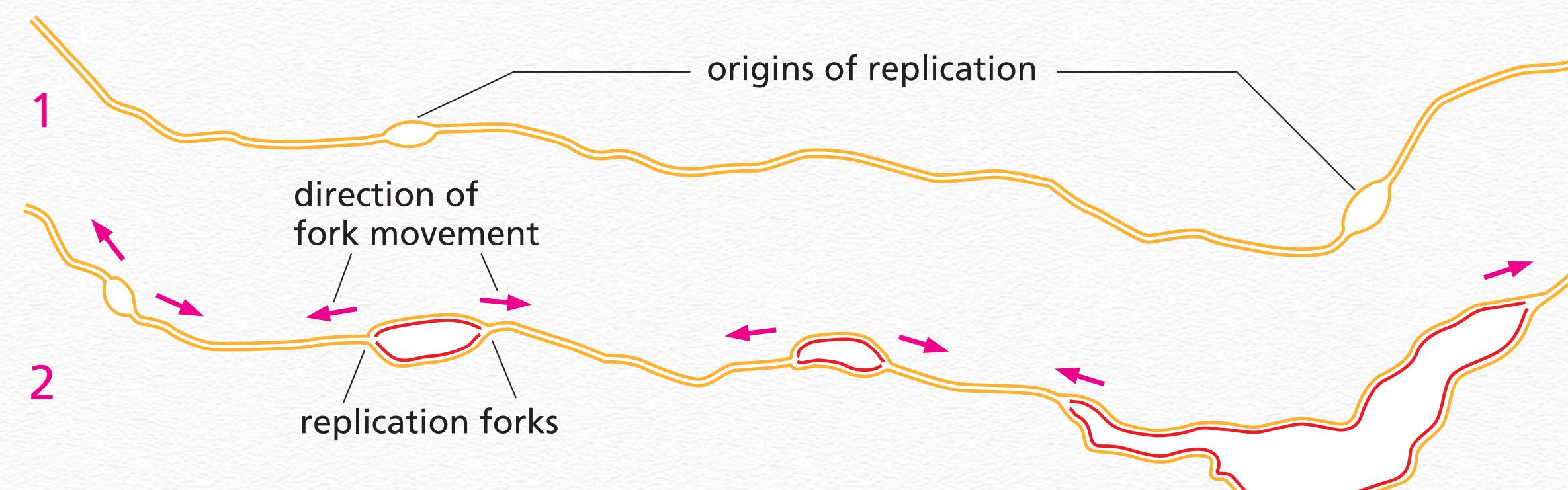
# DNA Replication



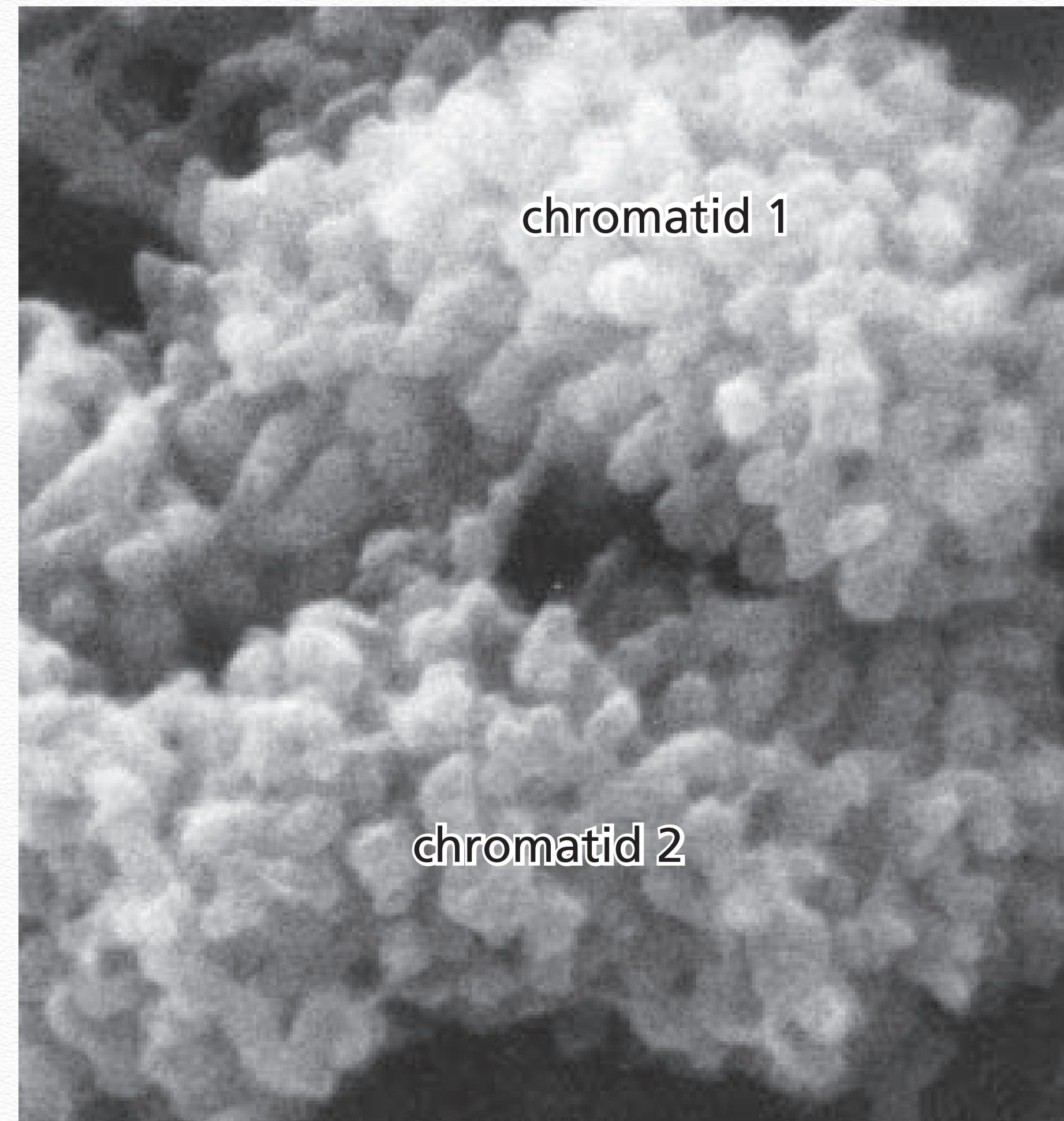
# Cell Division Elements



# Origin of Replication

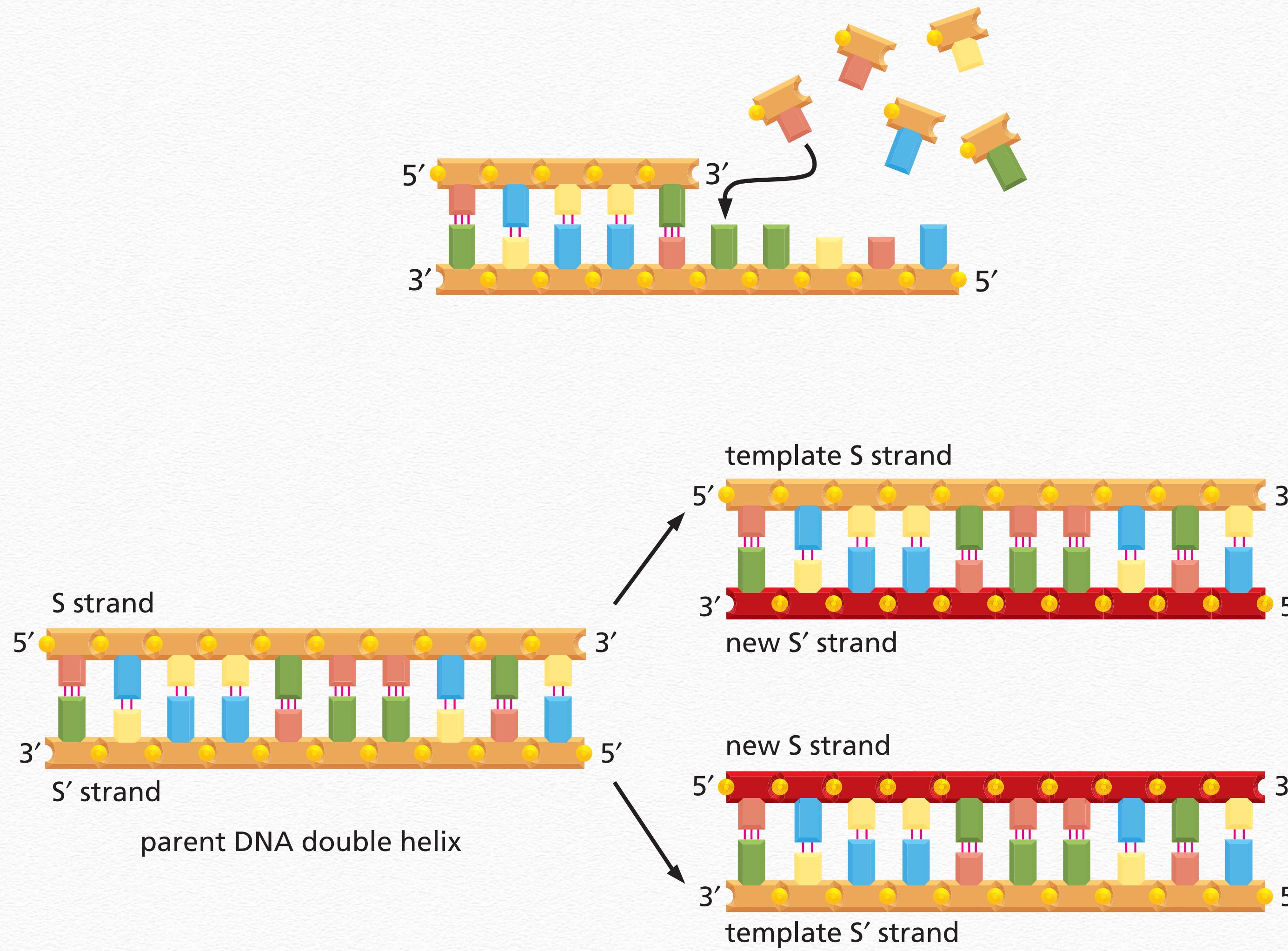


# Mitotic Chromosomes

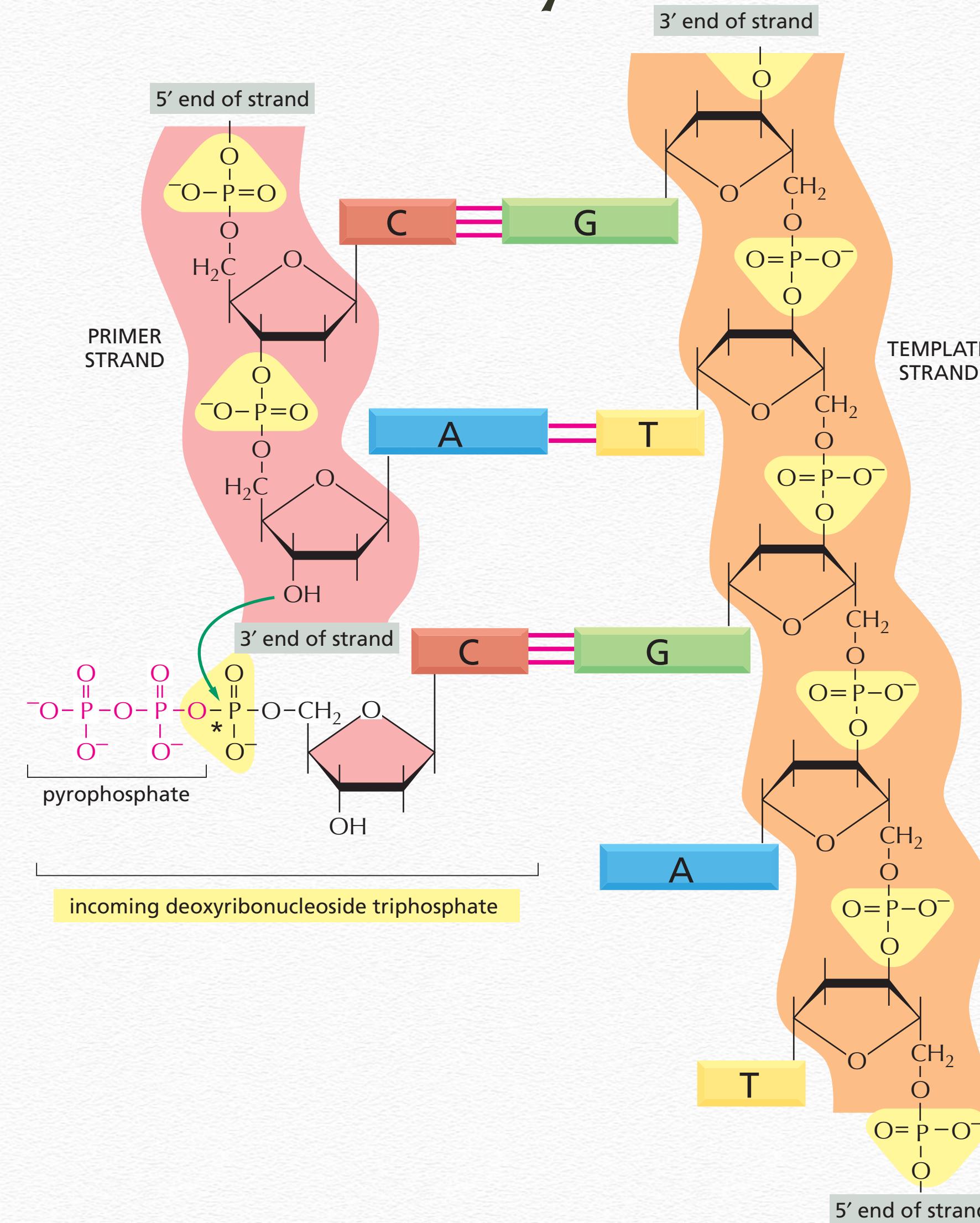


0.1  $\mu\text{m}$

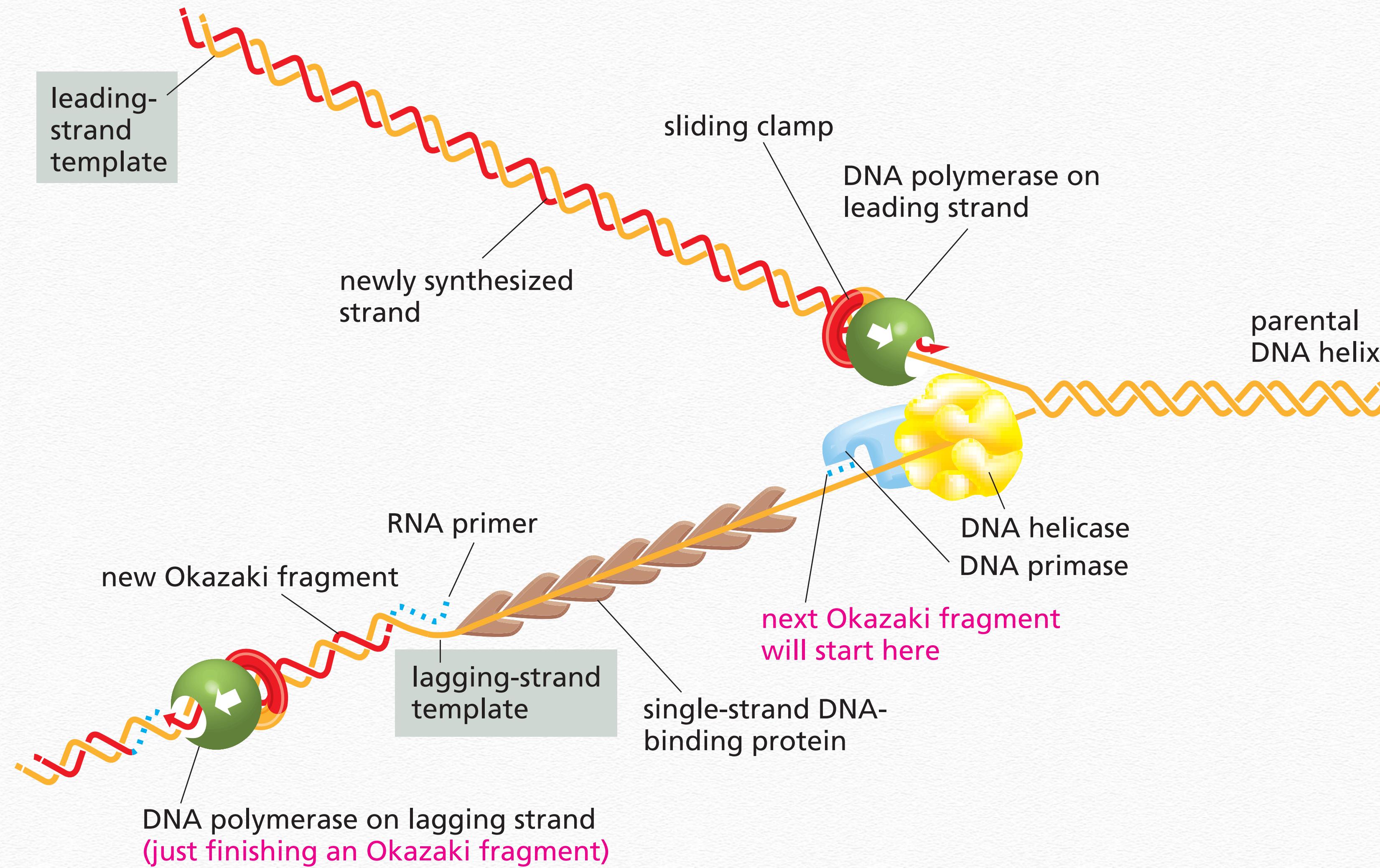
# DNA as a Template



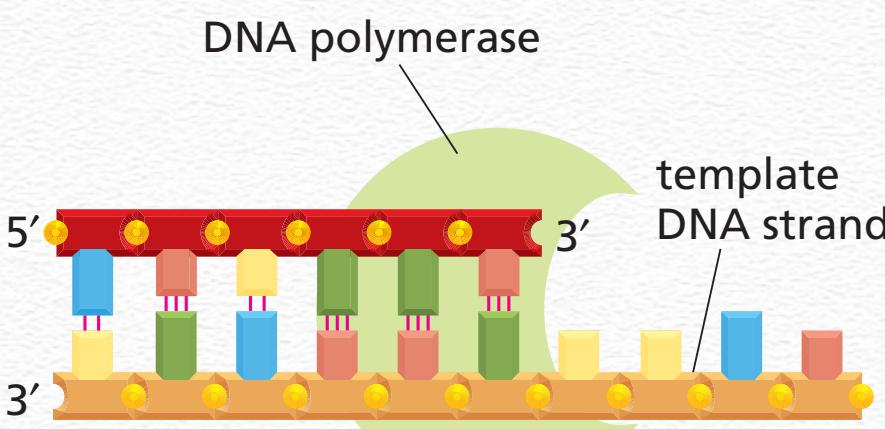
# DNA Synthesis



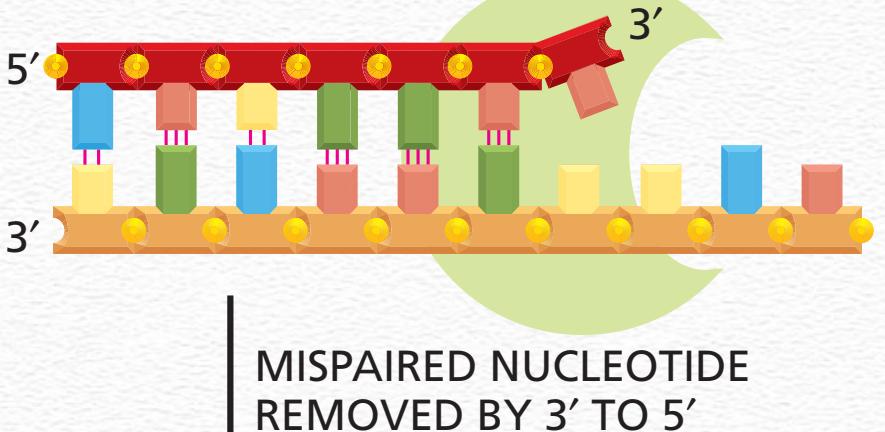
# DNA Synthesis Machine



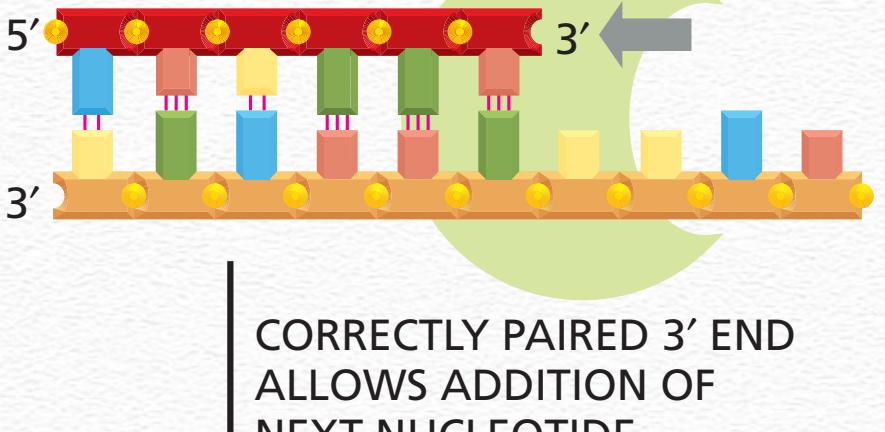
# Proofreading



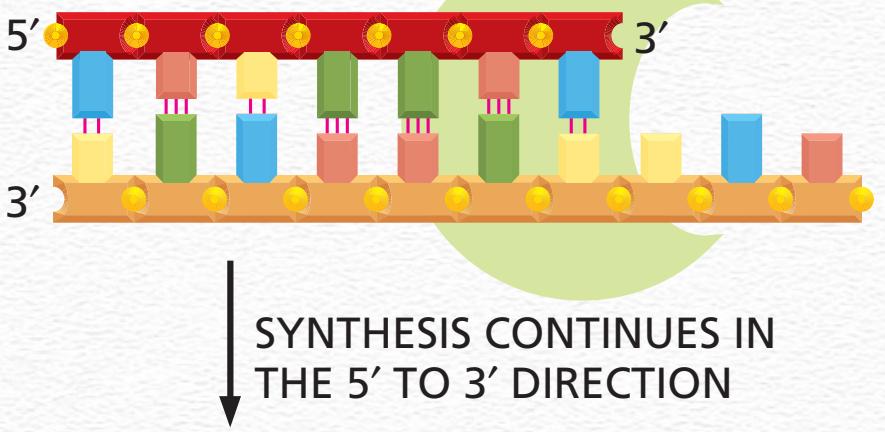
POLYMERASE ADDS AN INCORRECT NUCLEOTIDE



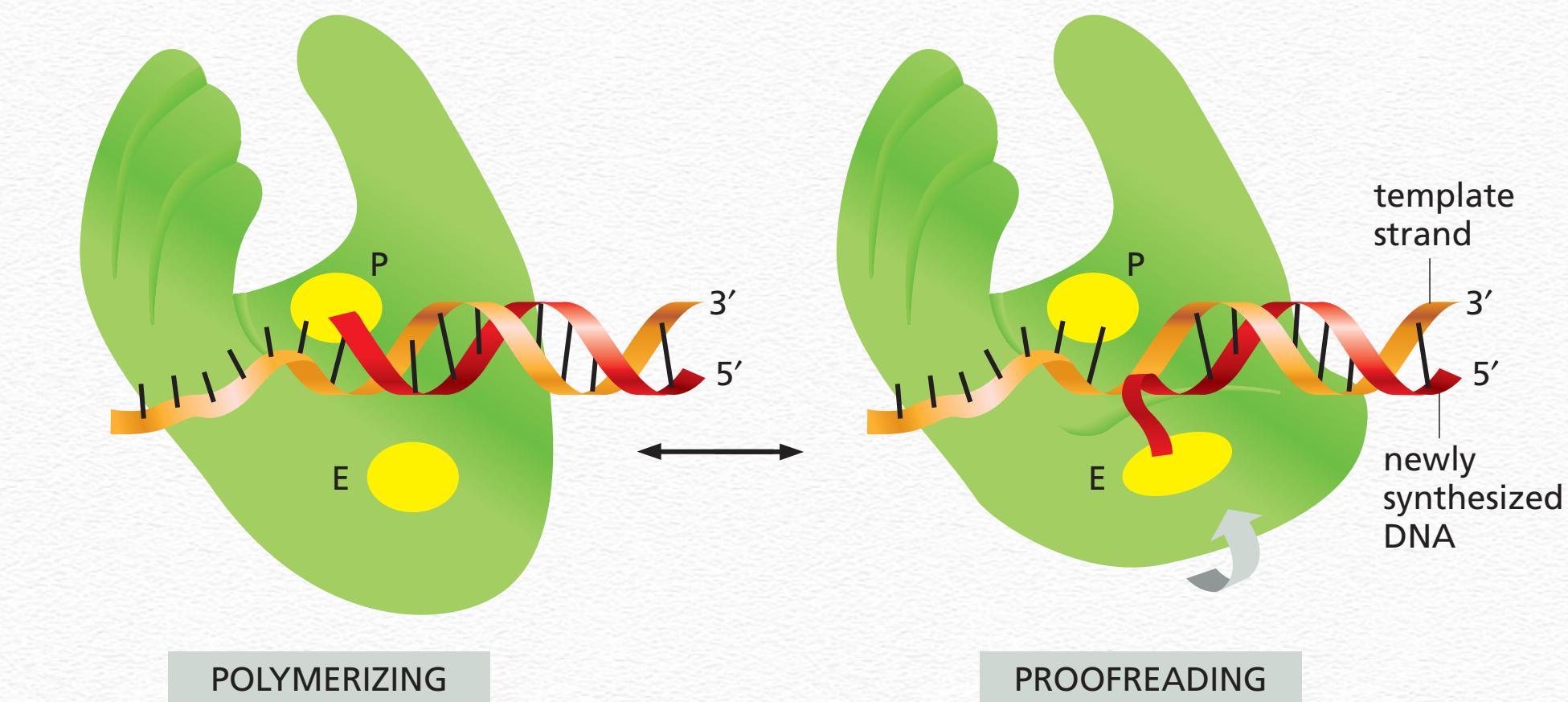
MISPAIRED NUCLEOTIDE REMOVED BY 3' TO 5' PROOFREADING



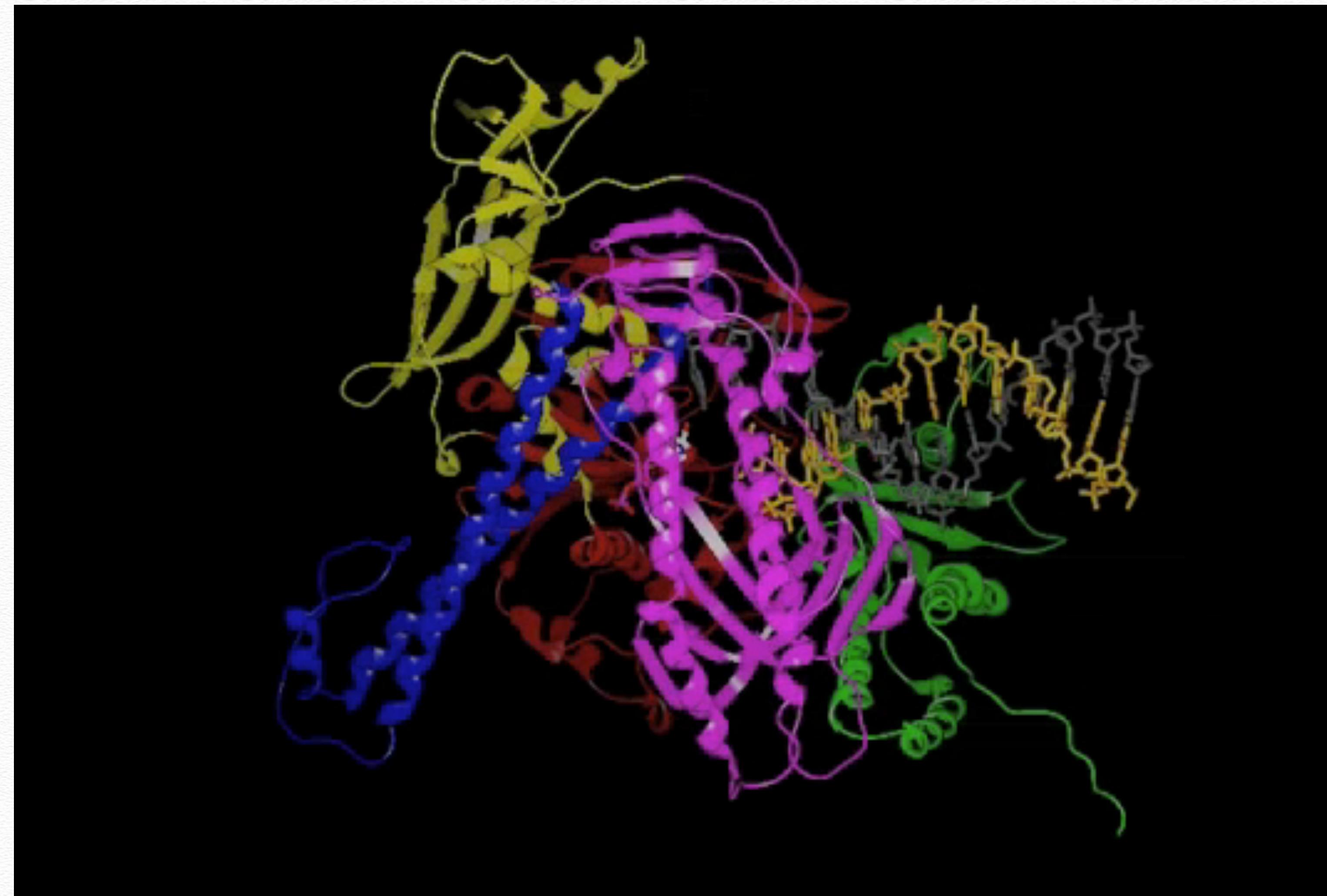
CORRECTLY PAIRED 3' END ALLOWS ADDITION OF NEXT NUCLEOTIDE



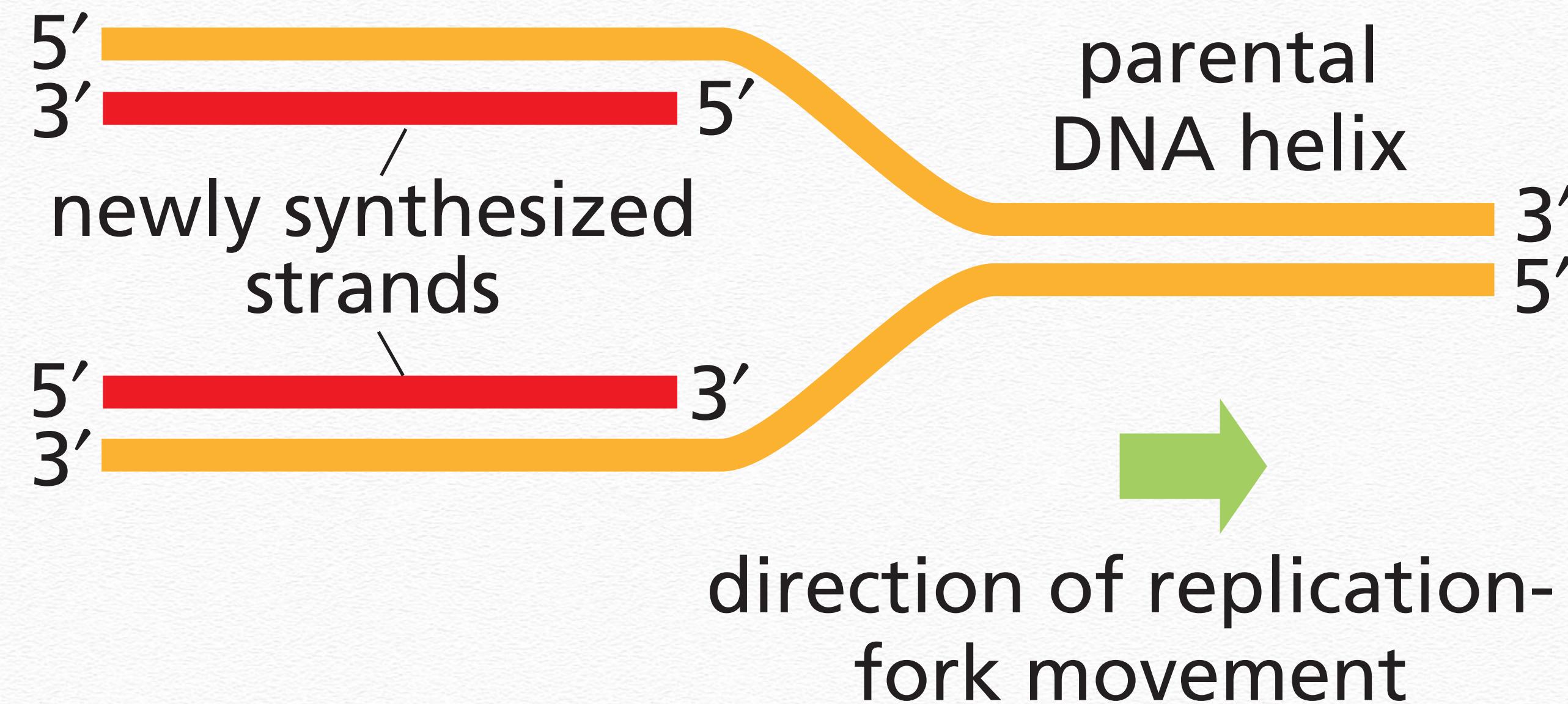
SYNTHESIS CONTINUES IN THE 5' TO 3' DIRECTION



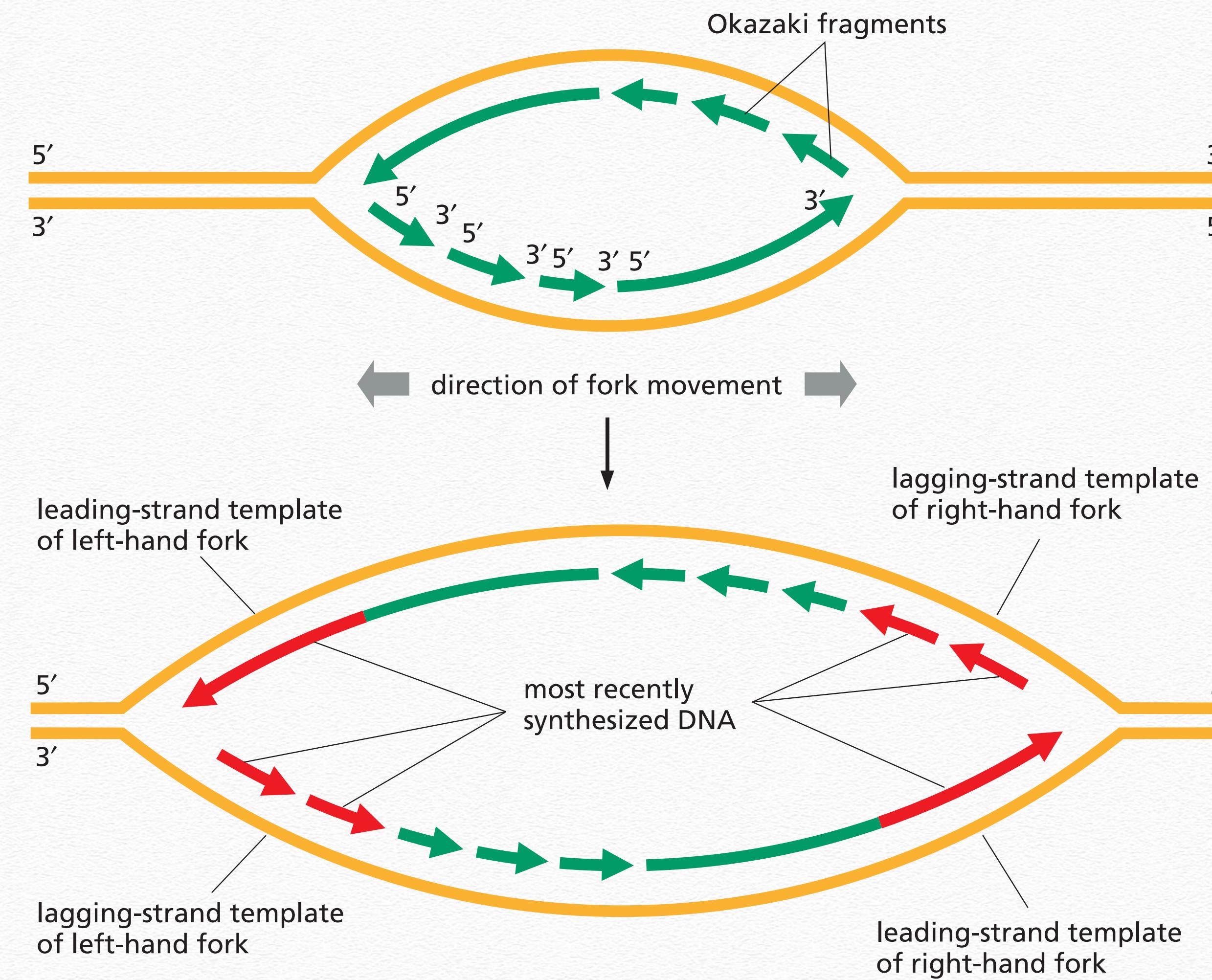
# DNA Polymerase



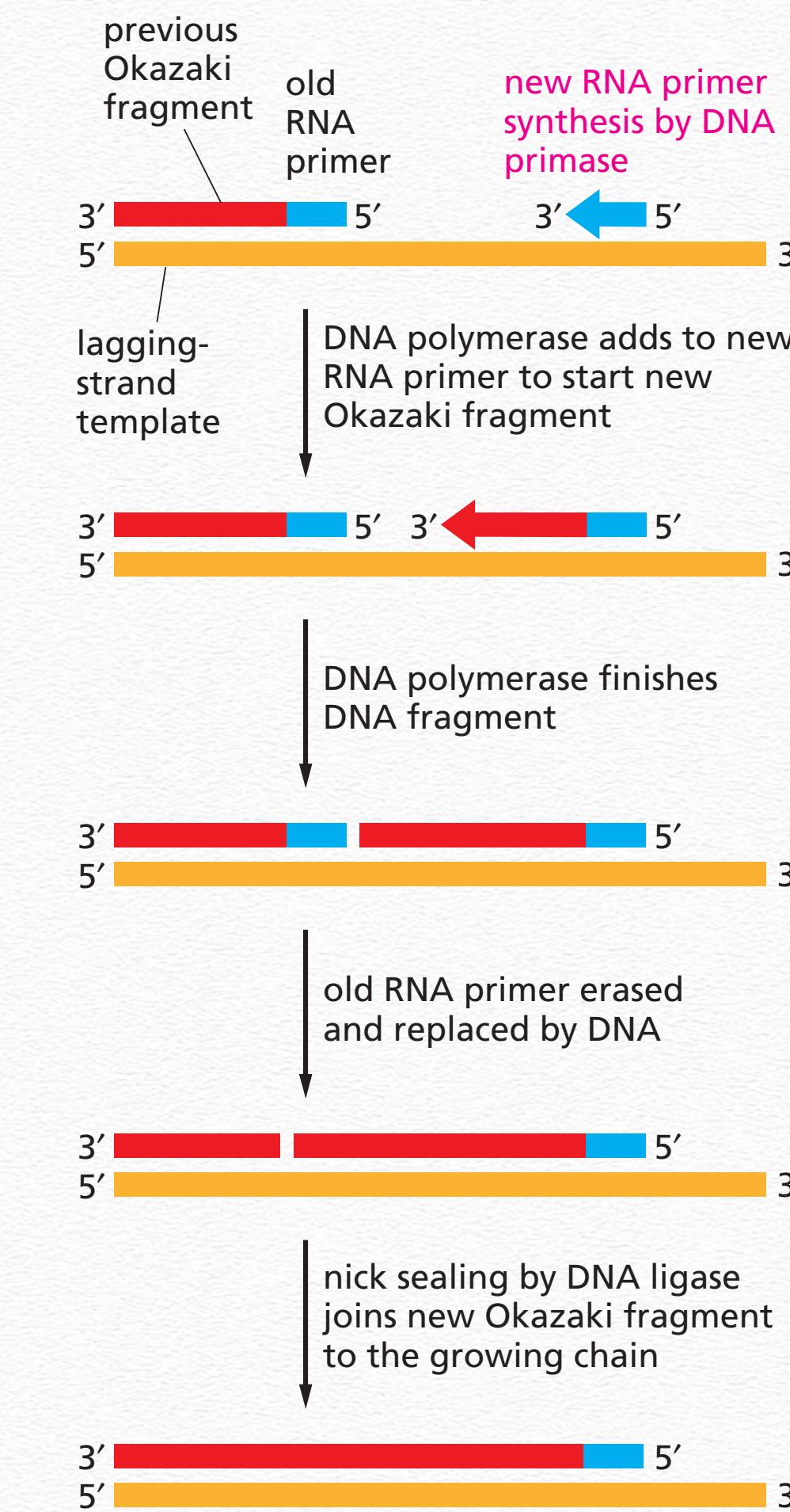
# How it can Happen?



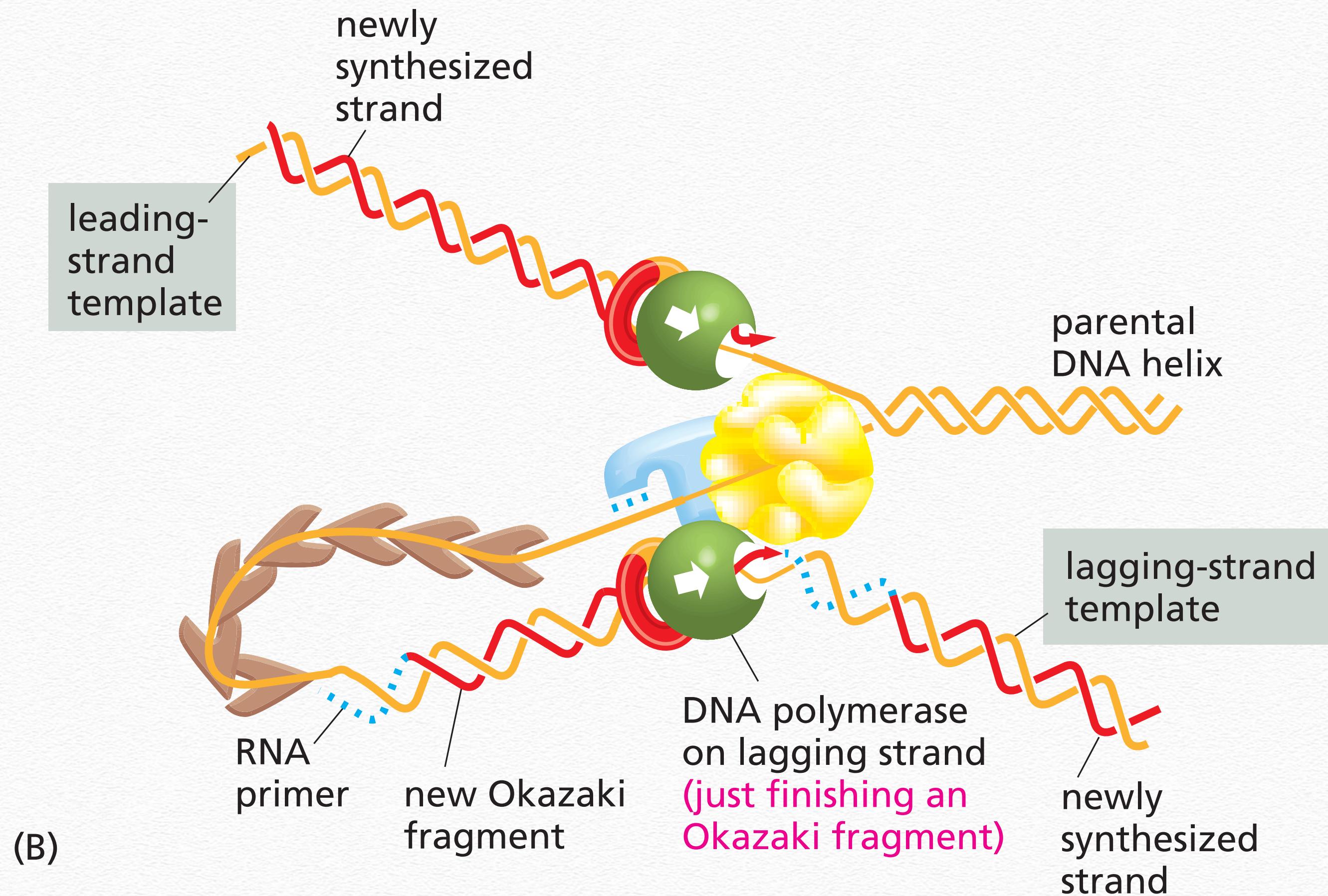
# DNA Replication Forks



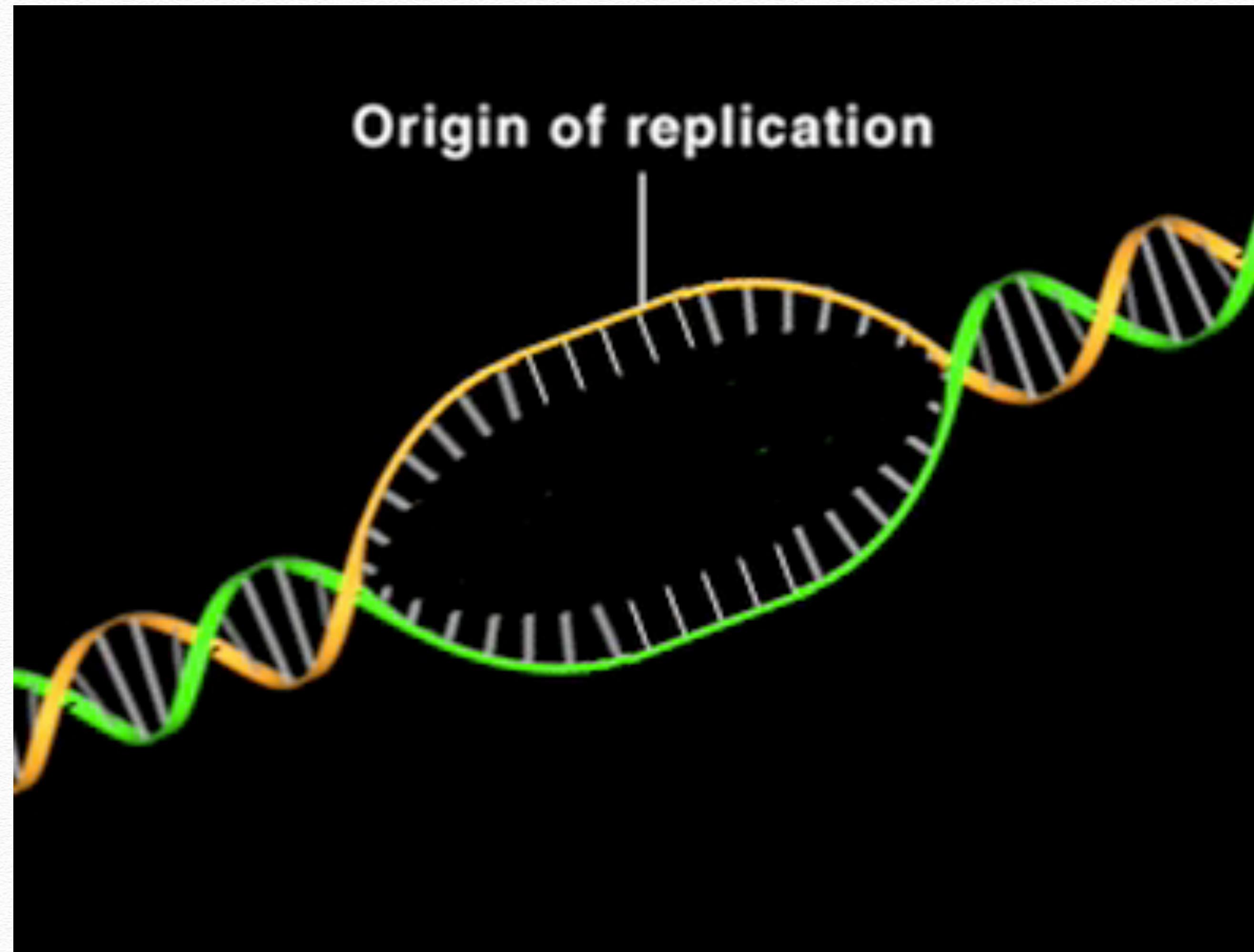
# Lagging Strand Synthesis



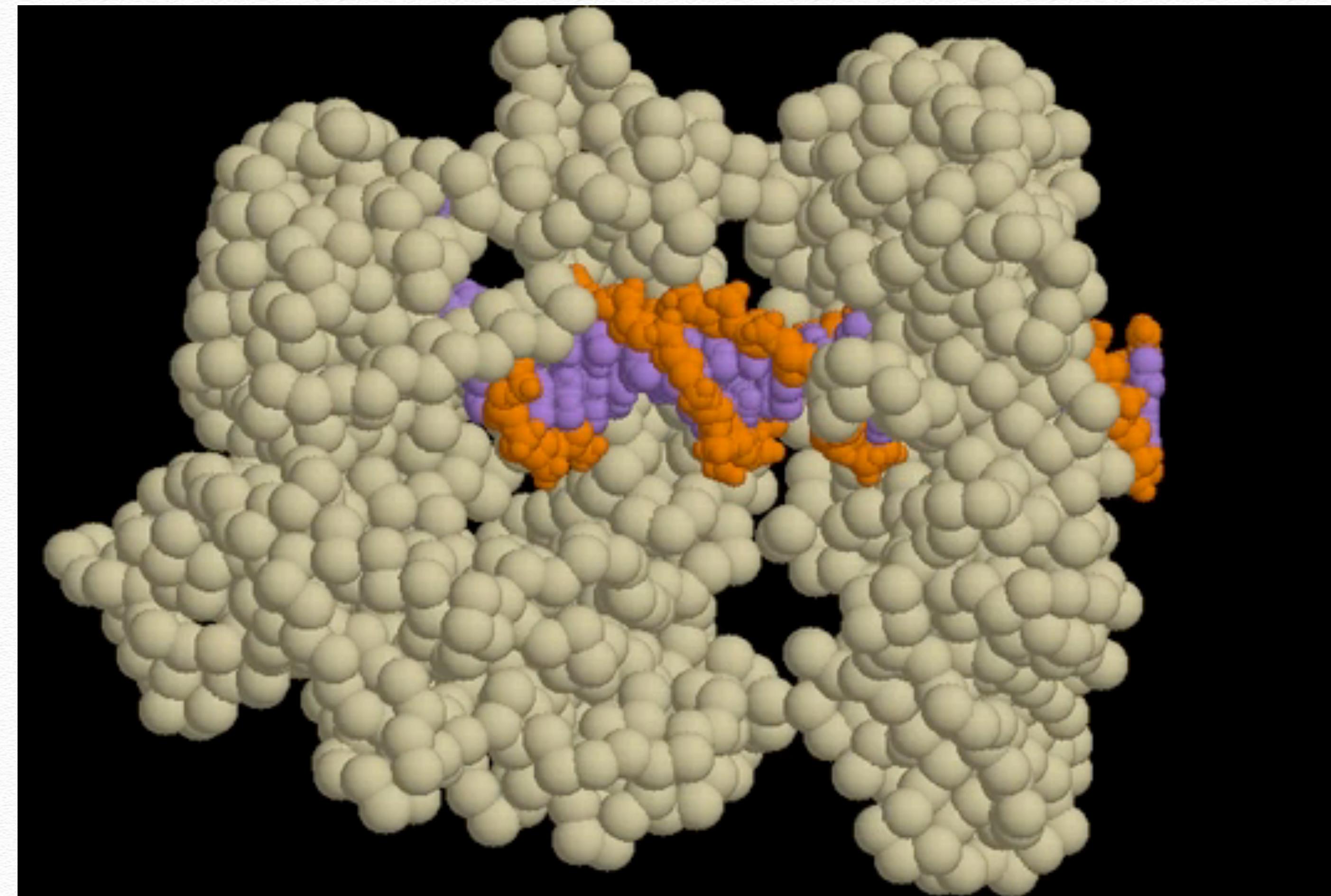
# DNA Replication Machine



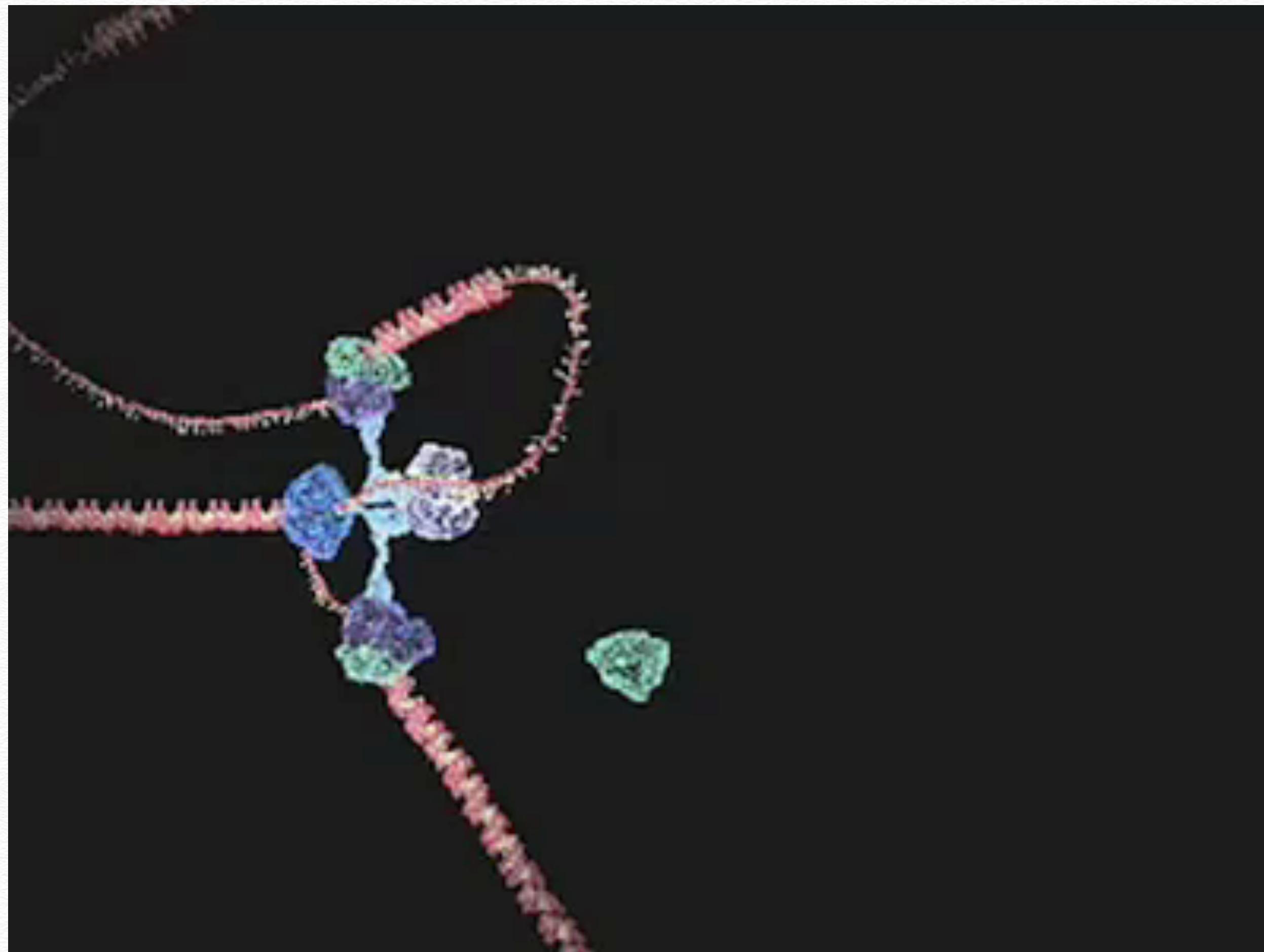
# DNA Replication Machine



# DNA Replication Machine



# DNA Replication Machine



# DNA Replication Machine

