

Figure 6-2 *Essential Cell Biology* (© Garland Science 2010)

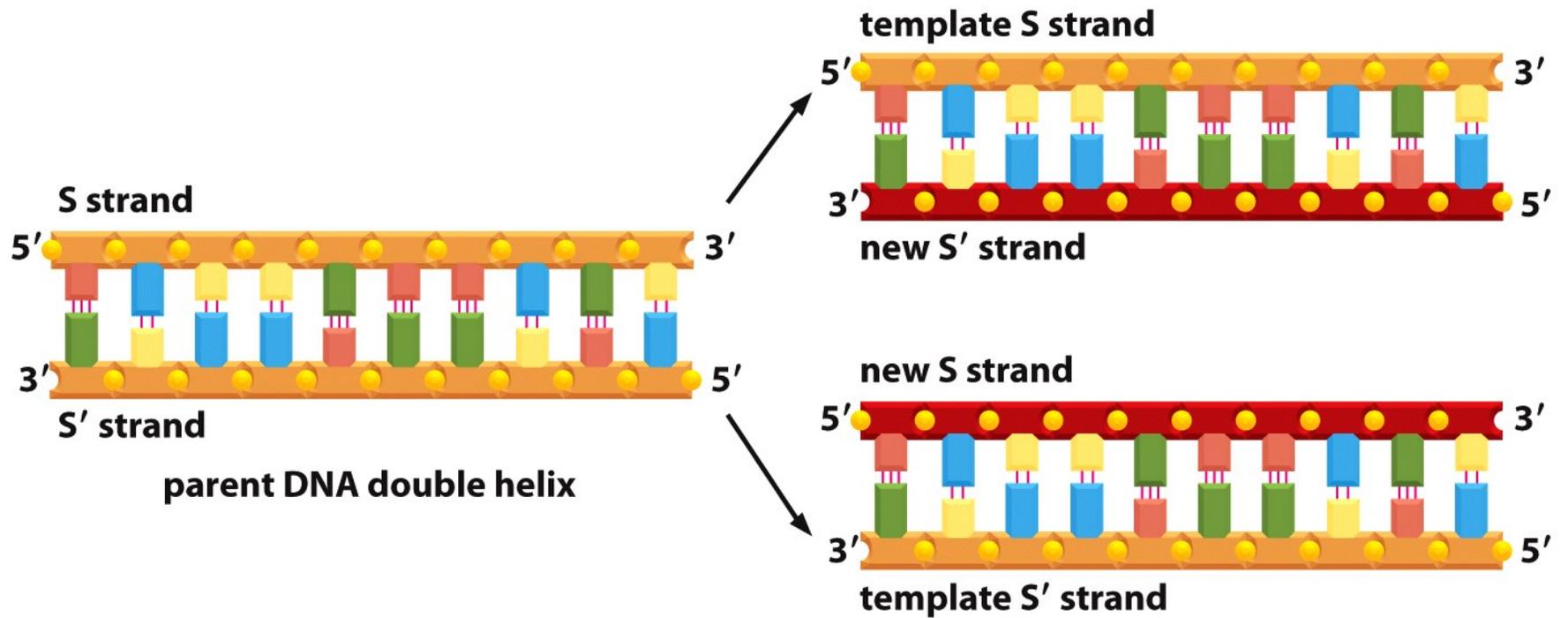


Figure 6-3 *Essential Cell Biology* (© Garland Science 2010)

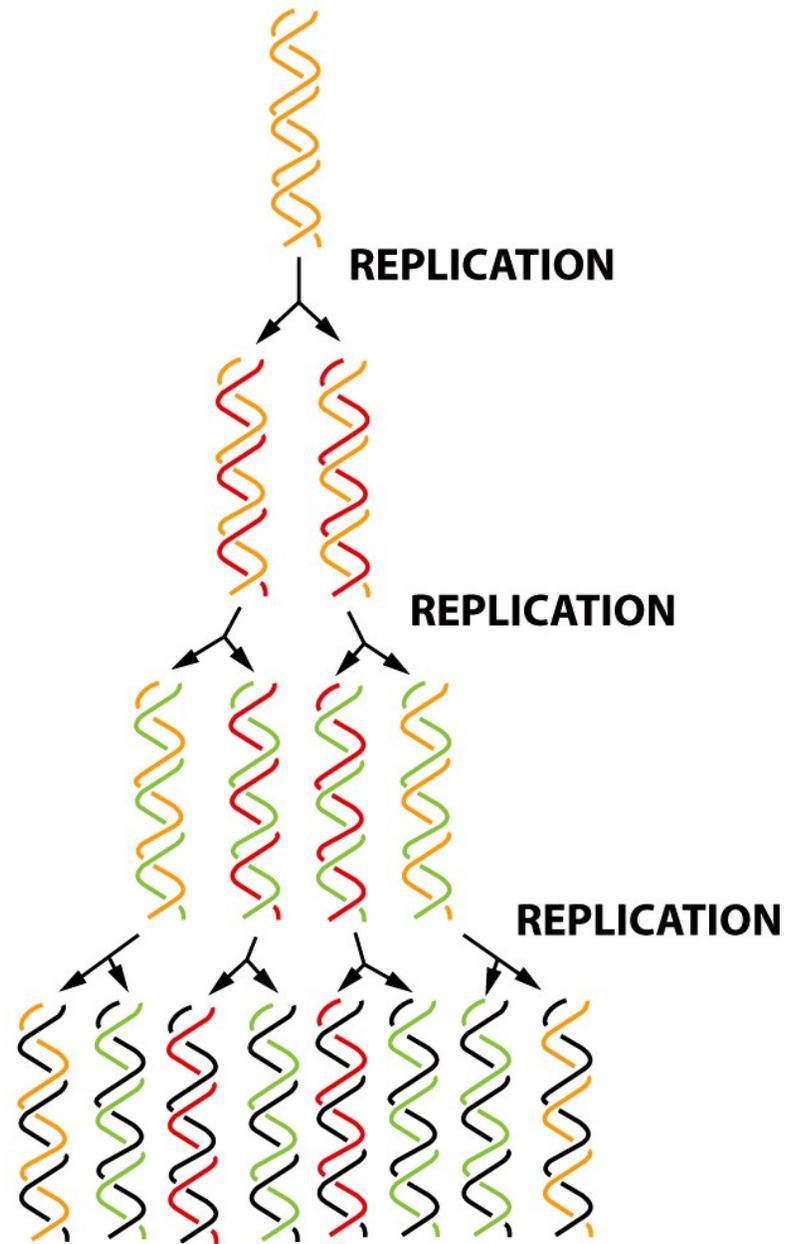


Figure 6-4 *Essential Cell Biology* (© Garland Science 2010)

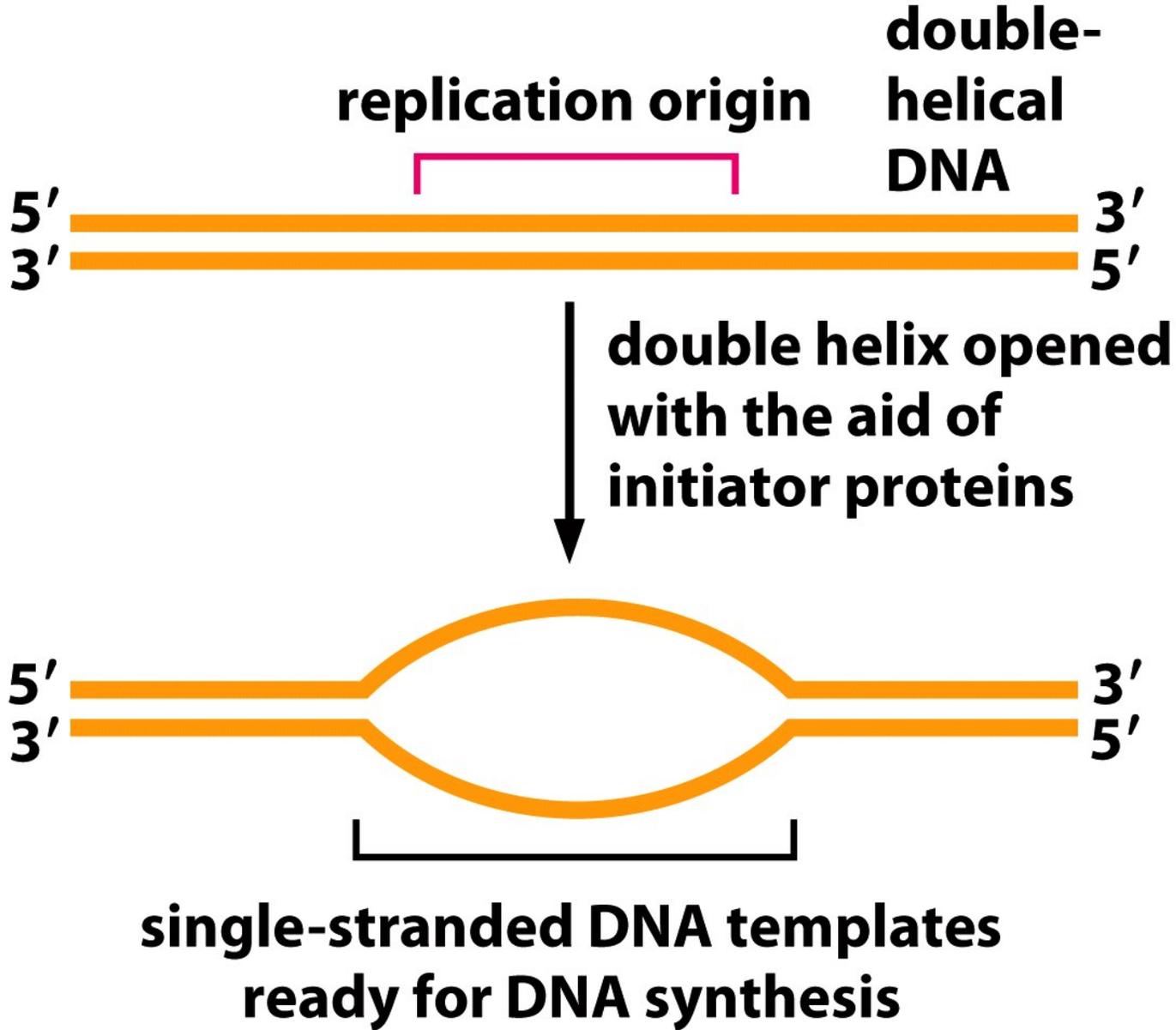


Figure 6-5 *Essential Cell Biology* (© Garland Science 2010)

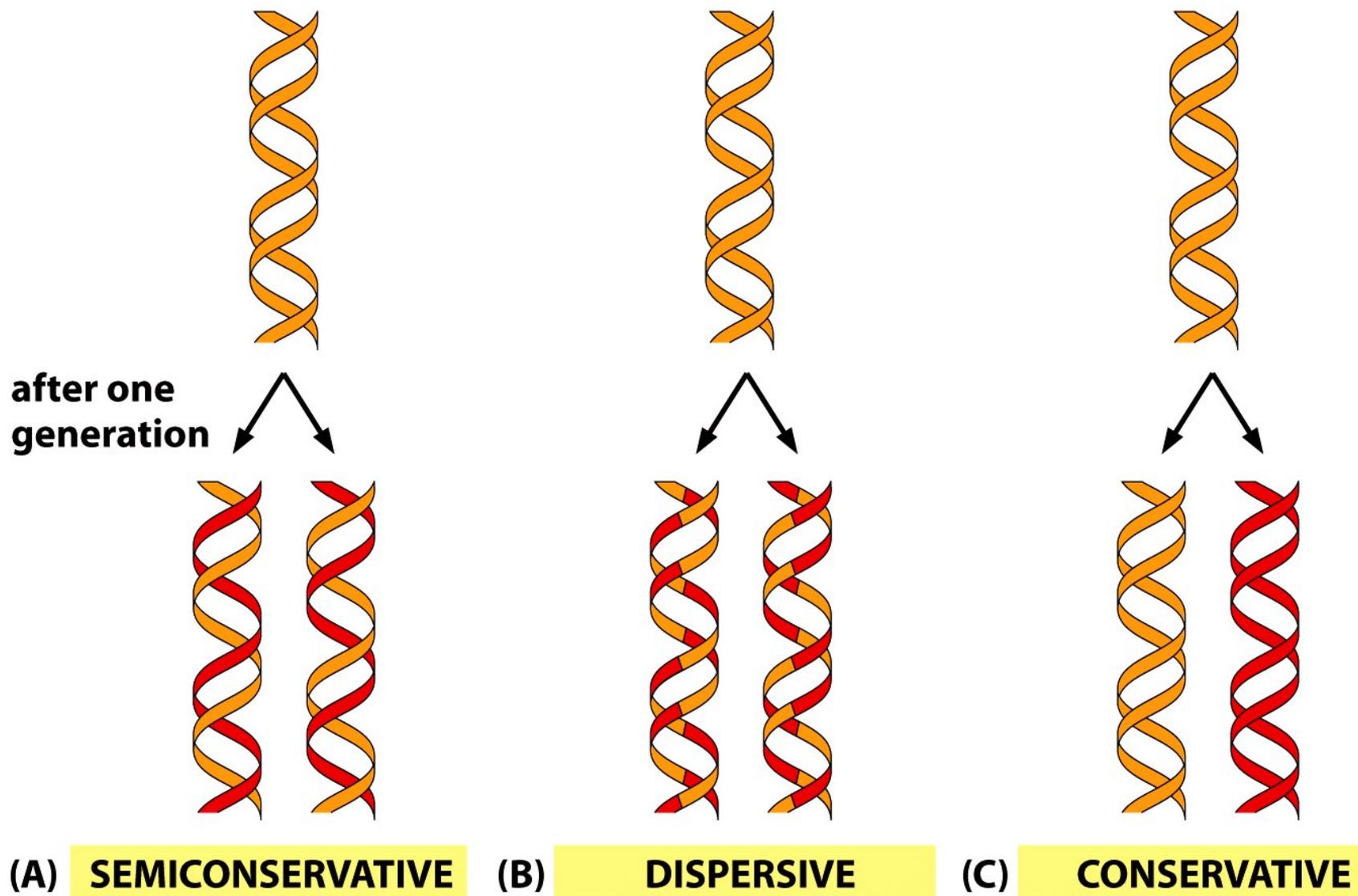


Figure 6-6 *Essential Cell Biology* (© Garland Science 2010)

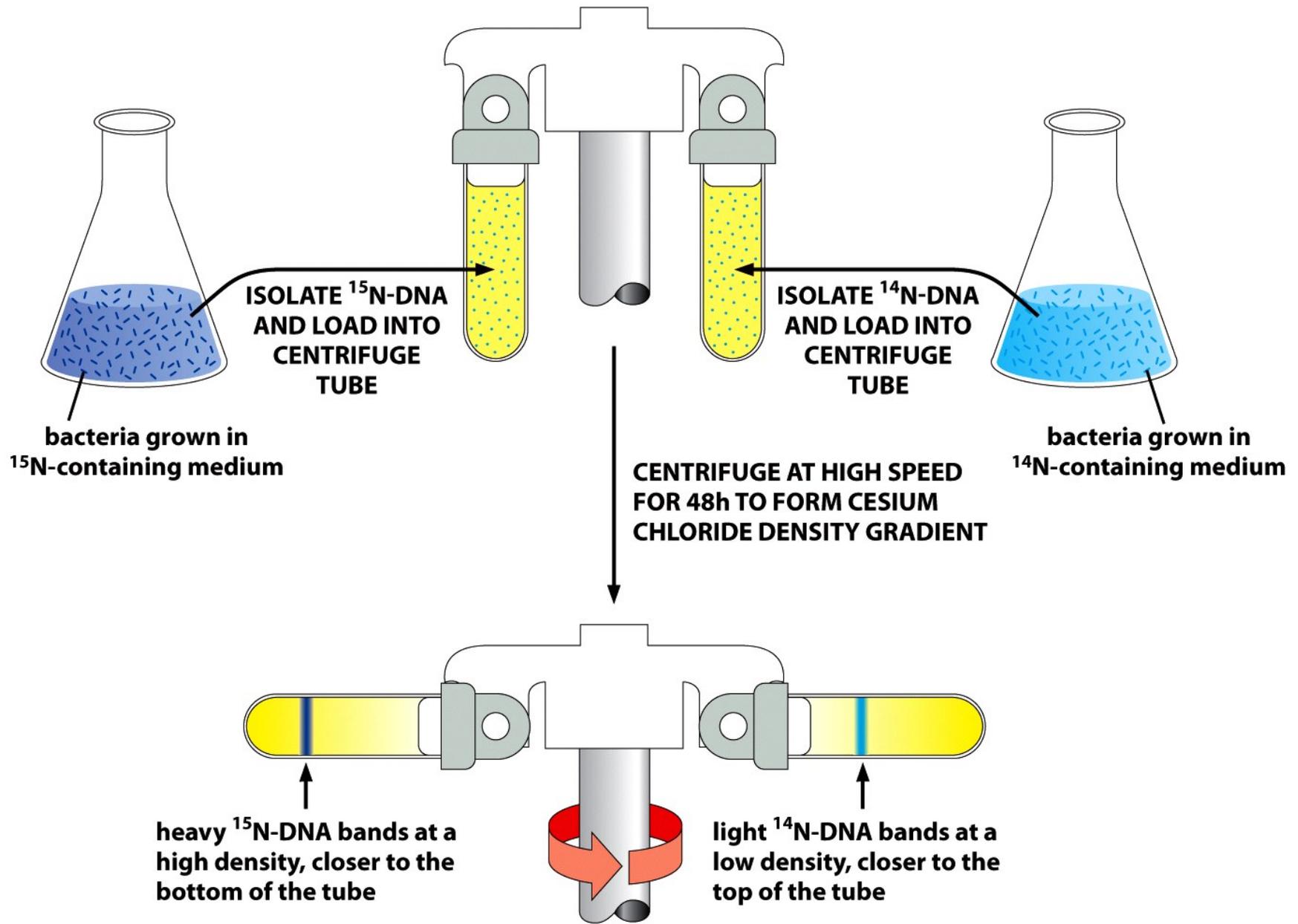


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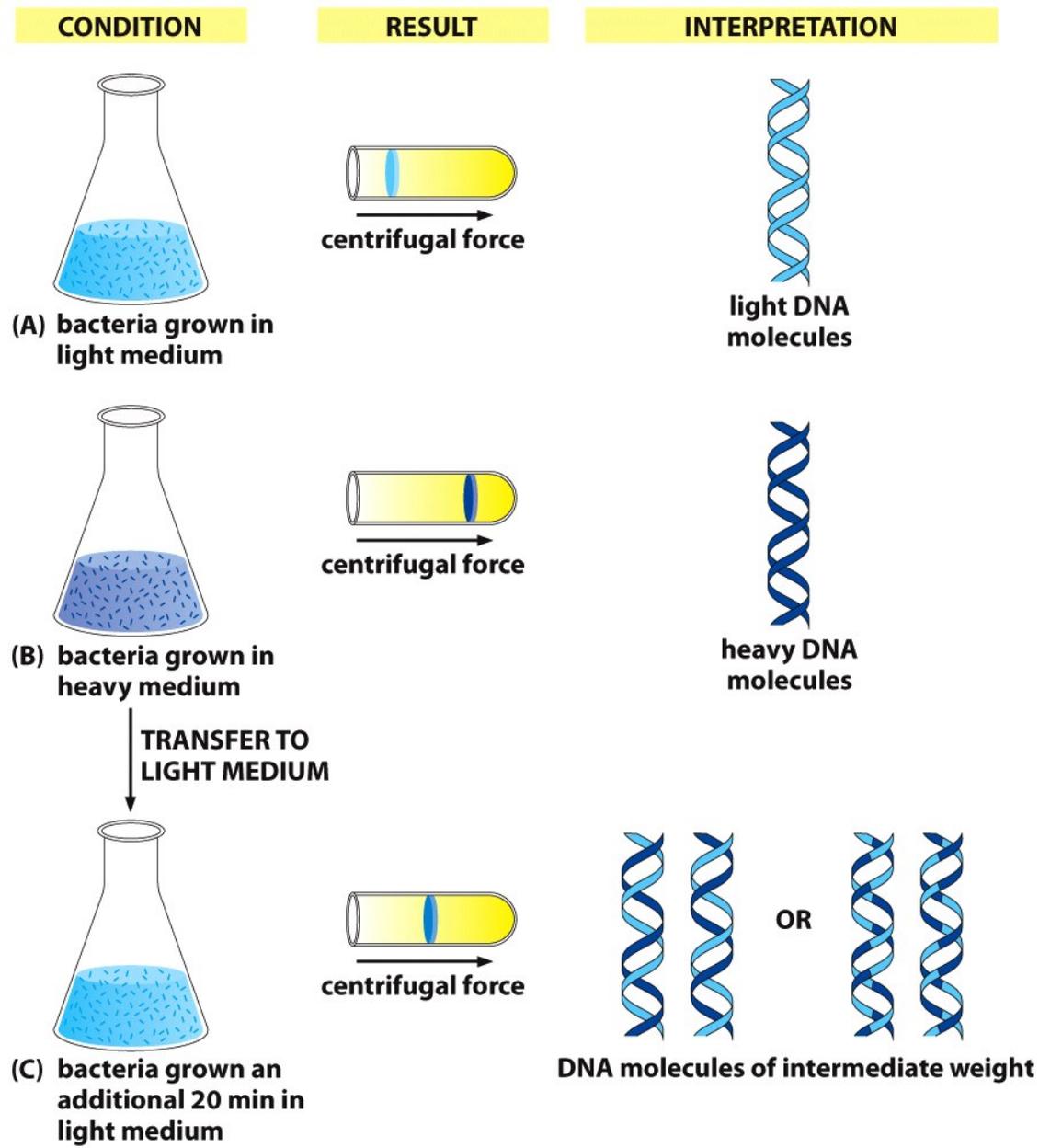


Figure 6-8 *Essential Cell Biology* (© Garland Science 2010)

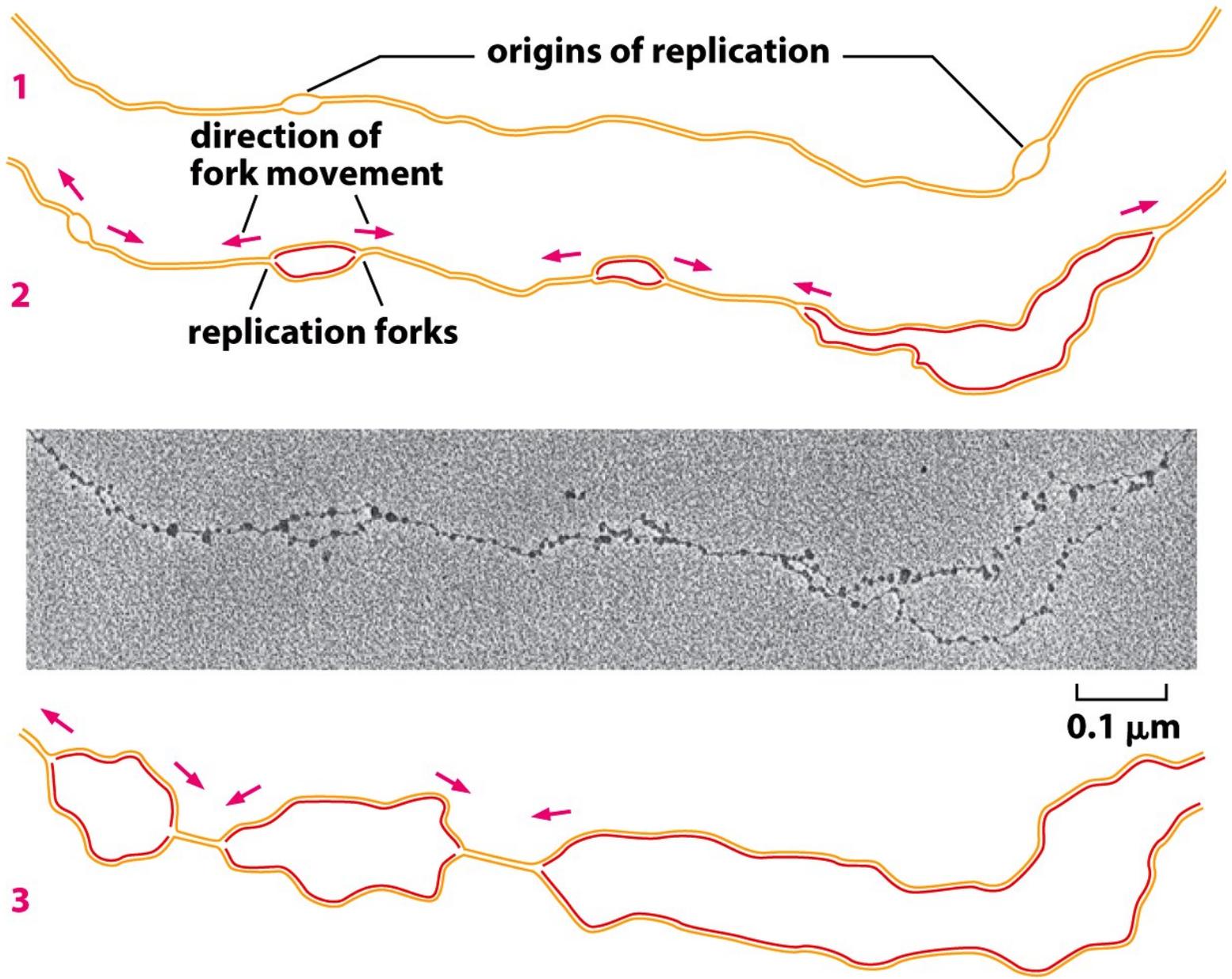


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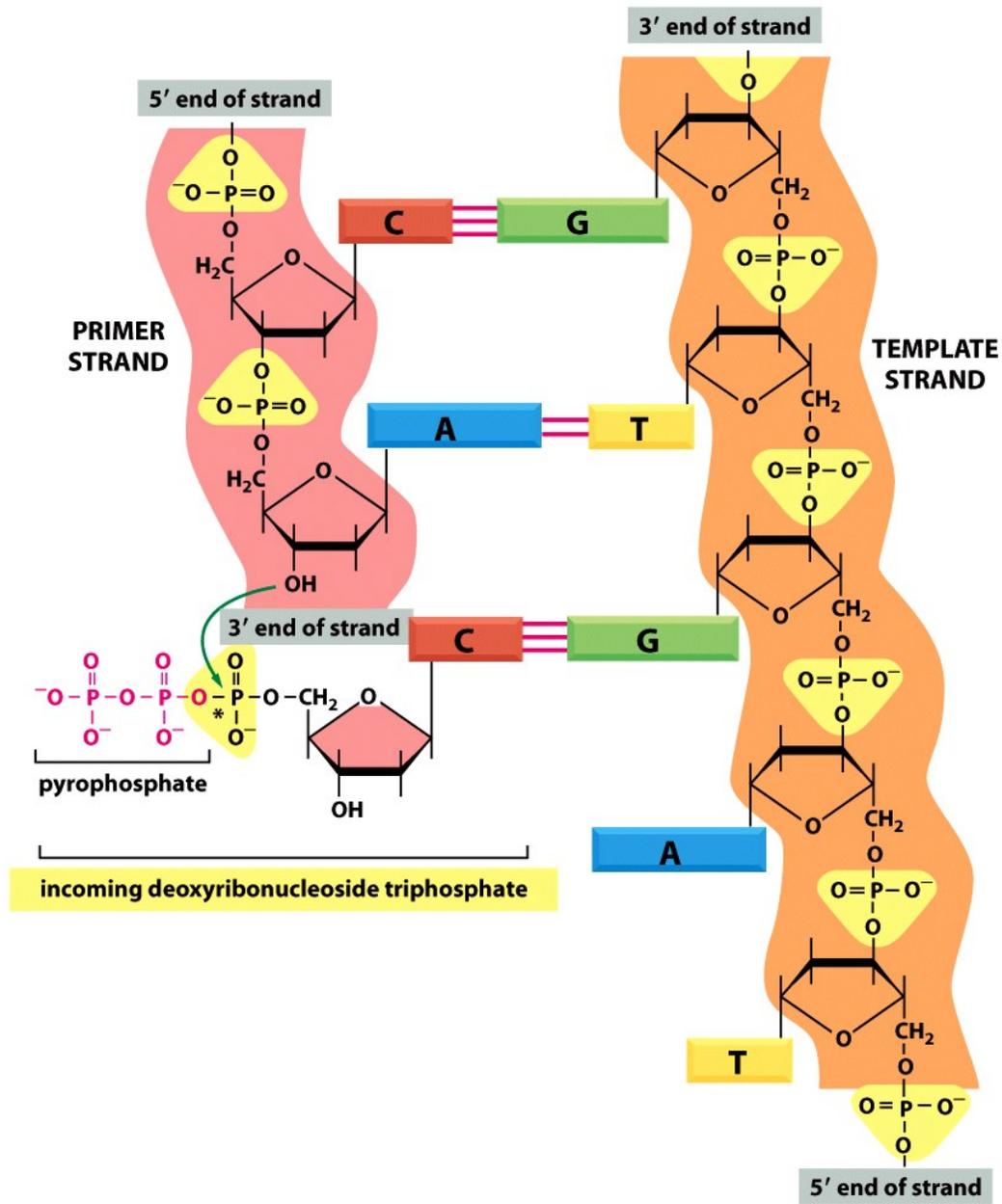


Figure 6-10 *Essential Cell Biology* (© Garland Science 2010)

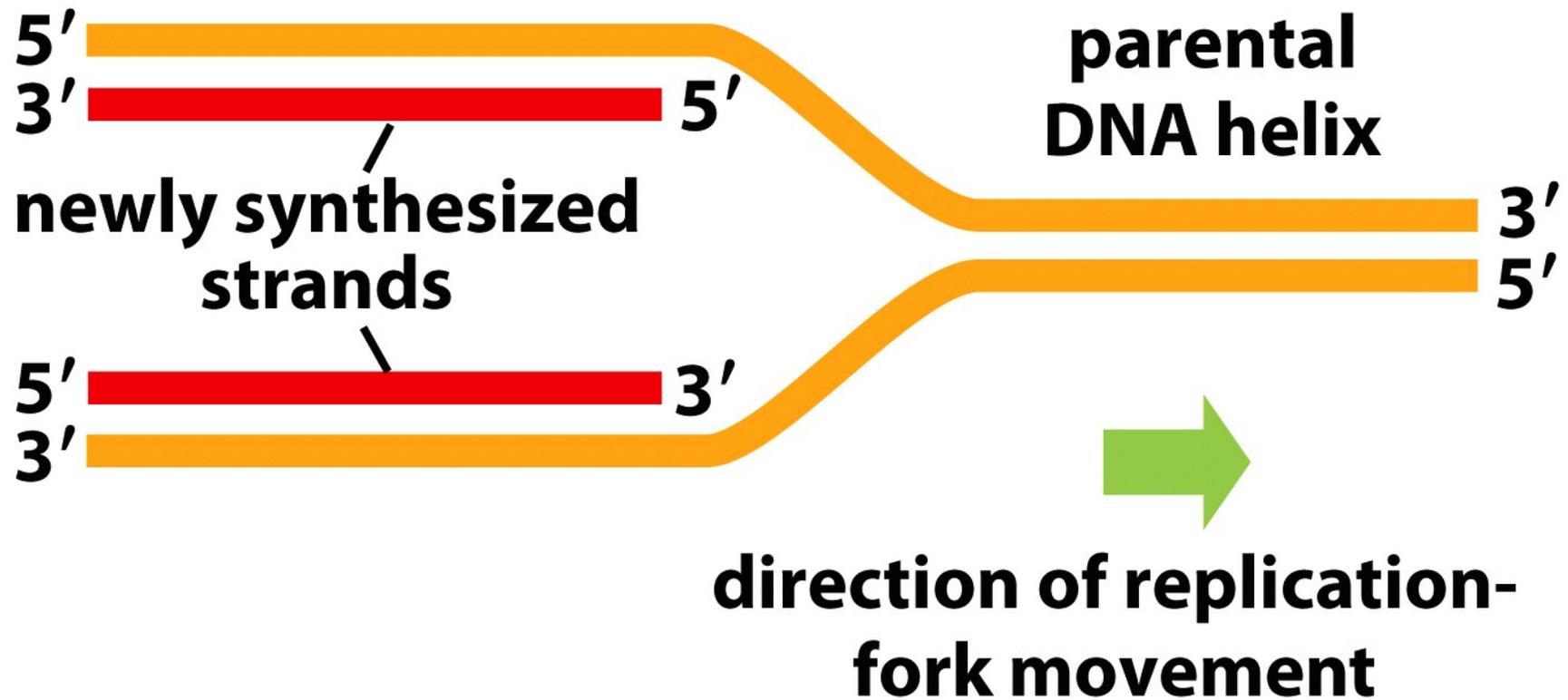


Figure 6-11 *Essential Cell Biology* (© Garland Science 2010)

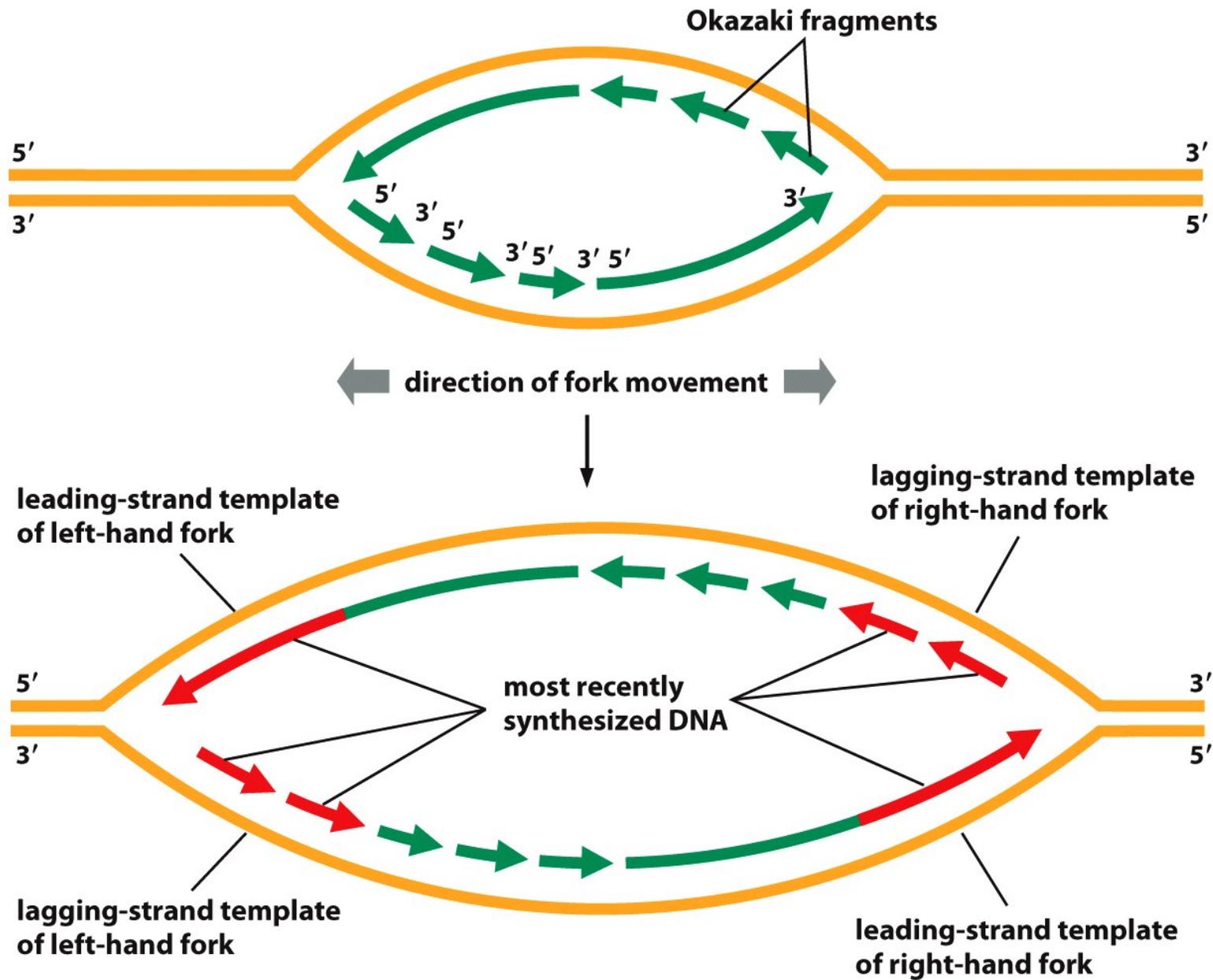


Figure 6-12 *Essential Cell Biology* (© Garland Science 2010)

Incorrectly inserted nucleotides are removed by DNA Pol 5' → 3' editing activity

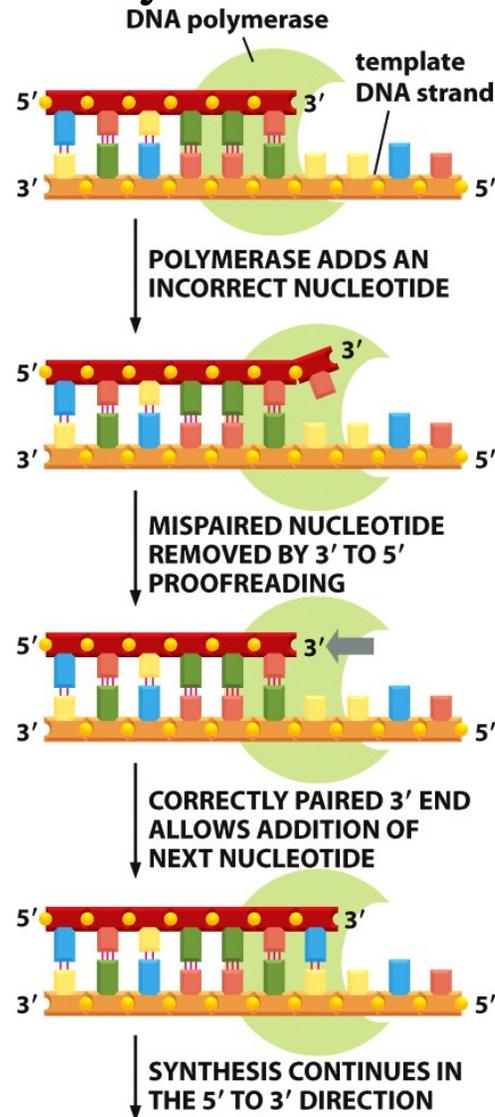
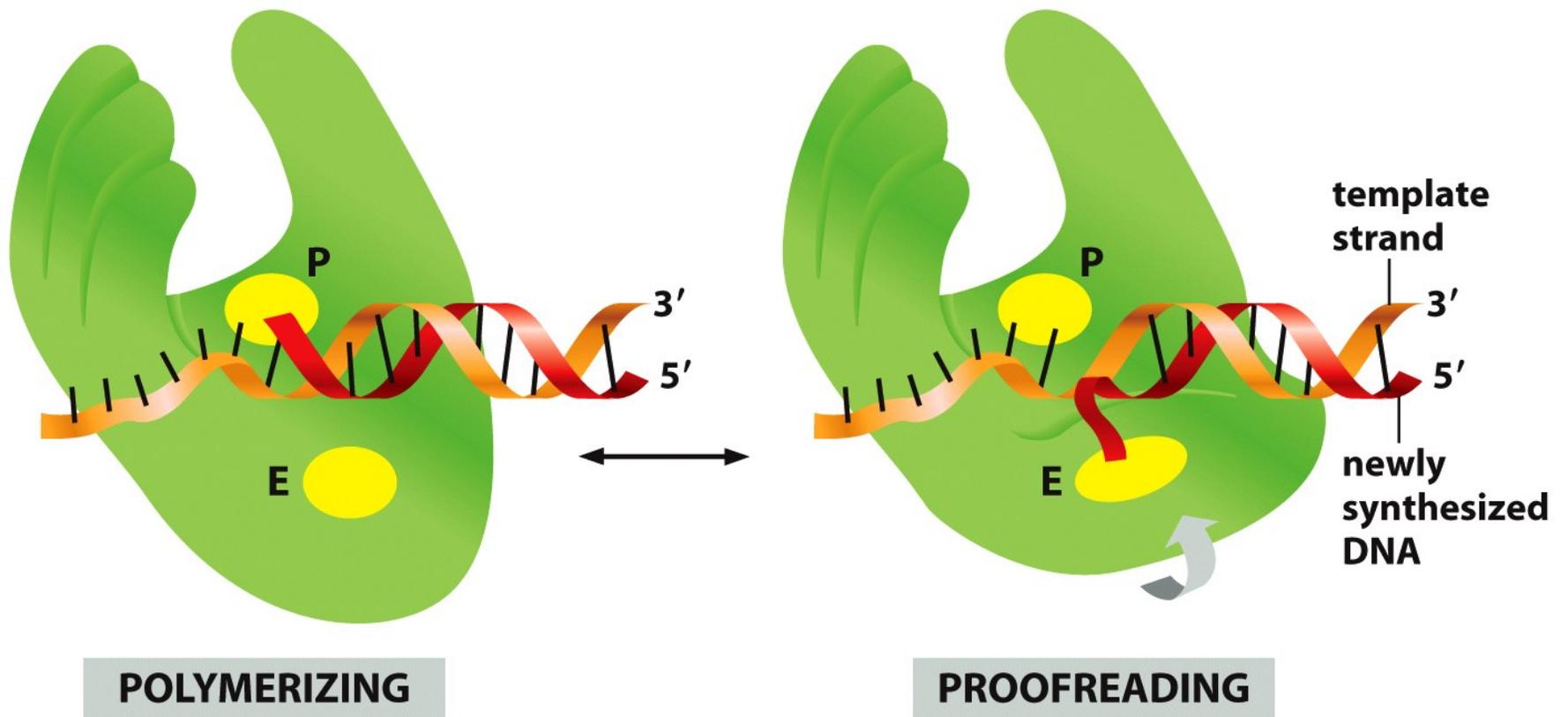


Figure 6-13 *Essential Cell Biology* (© Garland Science 2010)



With proofreading, error rate is 1 error in 10^7 bases

The replacement of RNA in DNA requires three enzymes

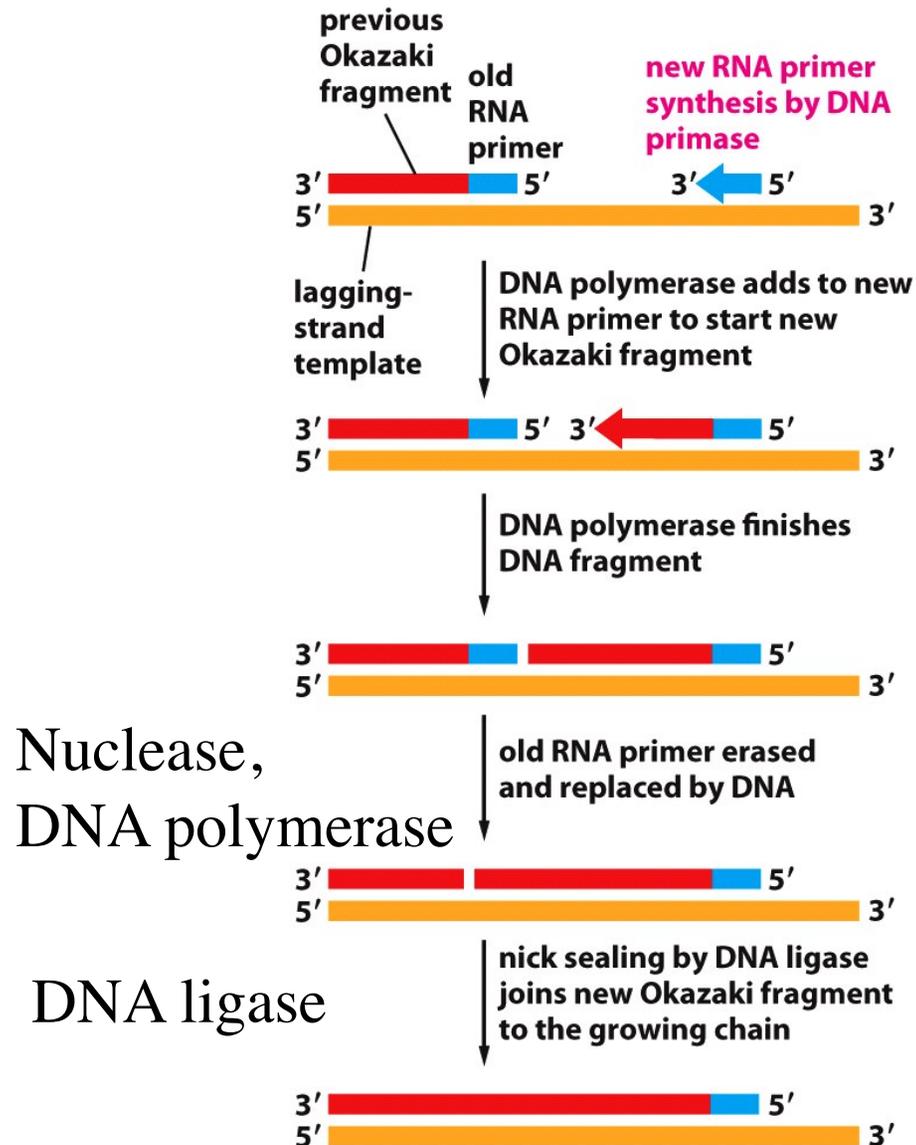


Figure 6-16 *Essential Cell Biology* (© Garland Science 2010)

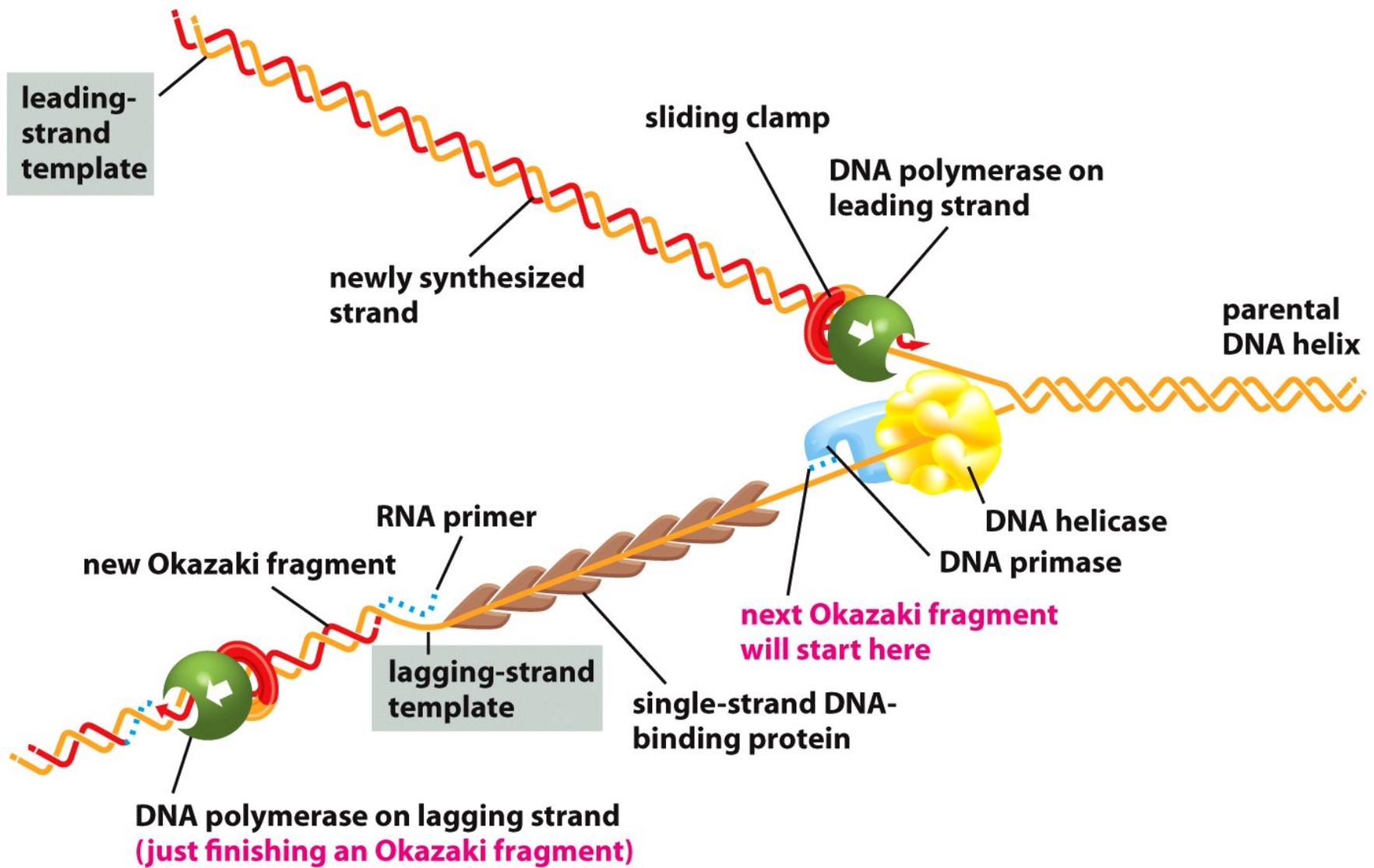


Figure 6-17a *Essential Cell Biology* (© Garland Science 2010)

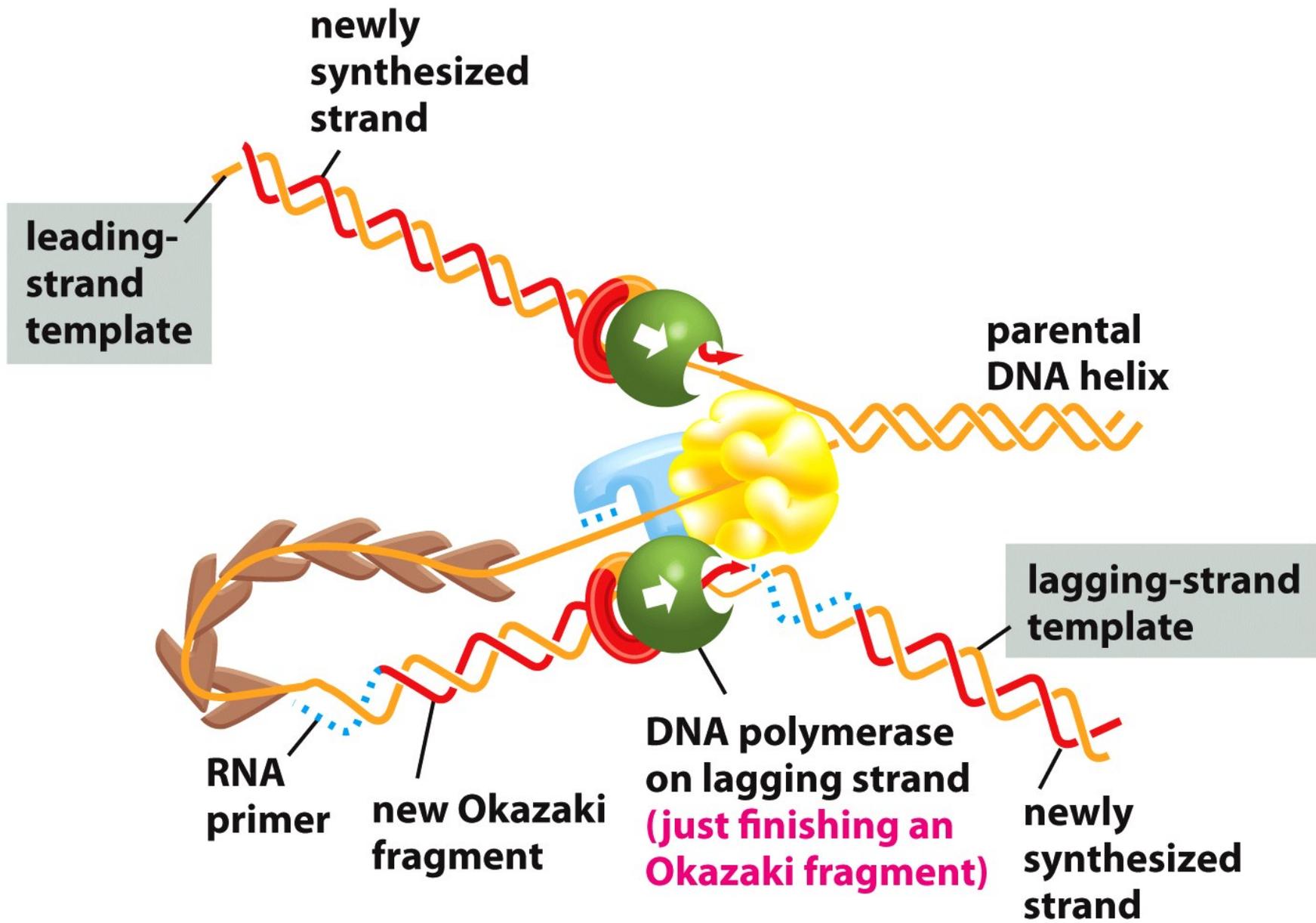


Figure 6-17b *Essential Cell Biology* (© Garland Science 2010)

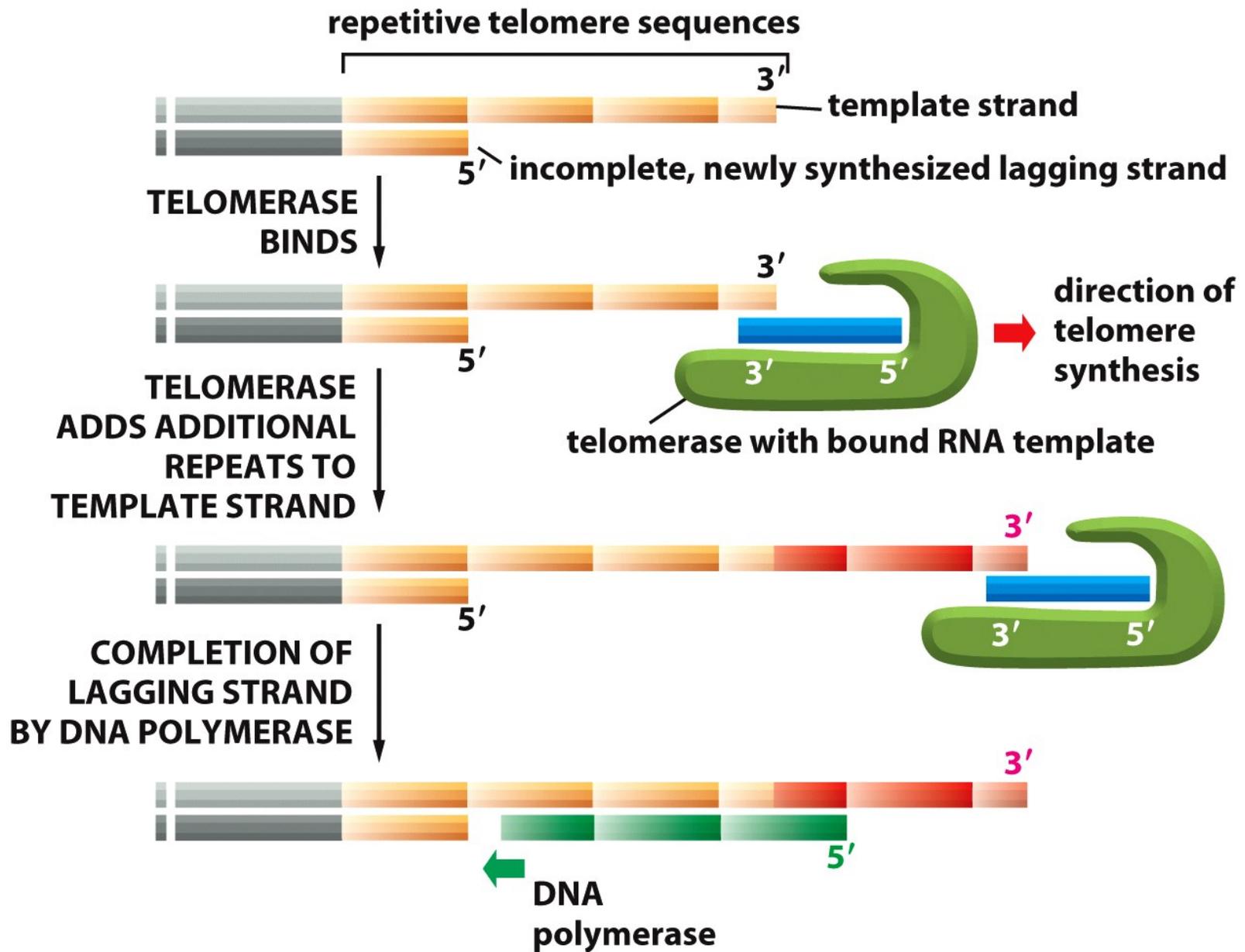
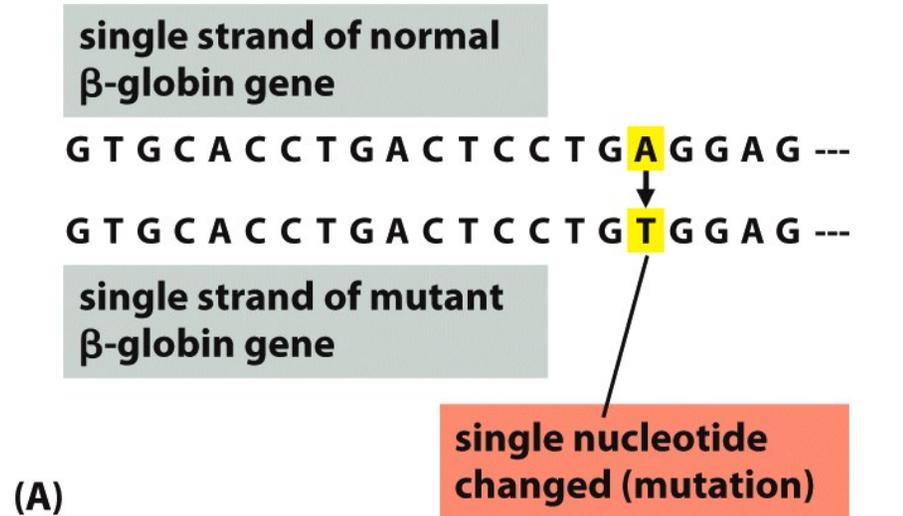
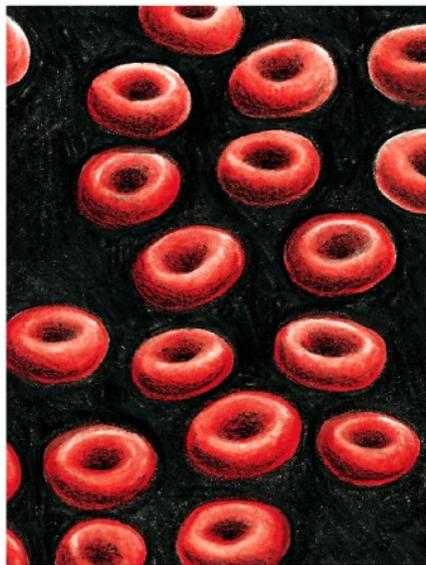


Figure 6-18 *Essential Cell Biology* (© Garland Science 2010)

Single base-pair changes in DNA give rise to many diseases



(A)



(B)

5 μ m



(C)

5 μ m

Also.....

Huntington's Disease

Hemacrhomatosis

Cystic fibrosis

Muscular Dystrophy

Haemophilia A & B

Achonroplasia

And many others!

$\sim 10^{13} - 10^{14}$ cells
in human body

Accumulation of mutations increases cancer risk

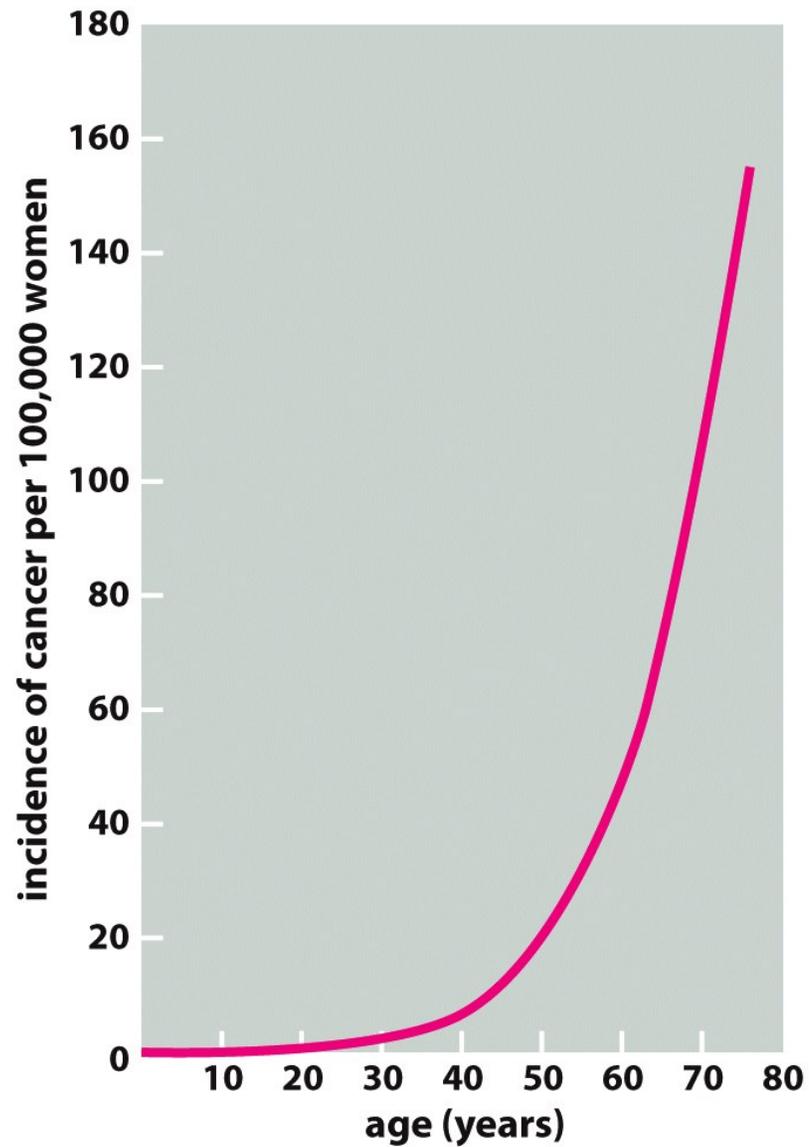
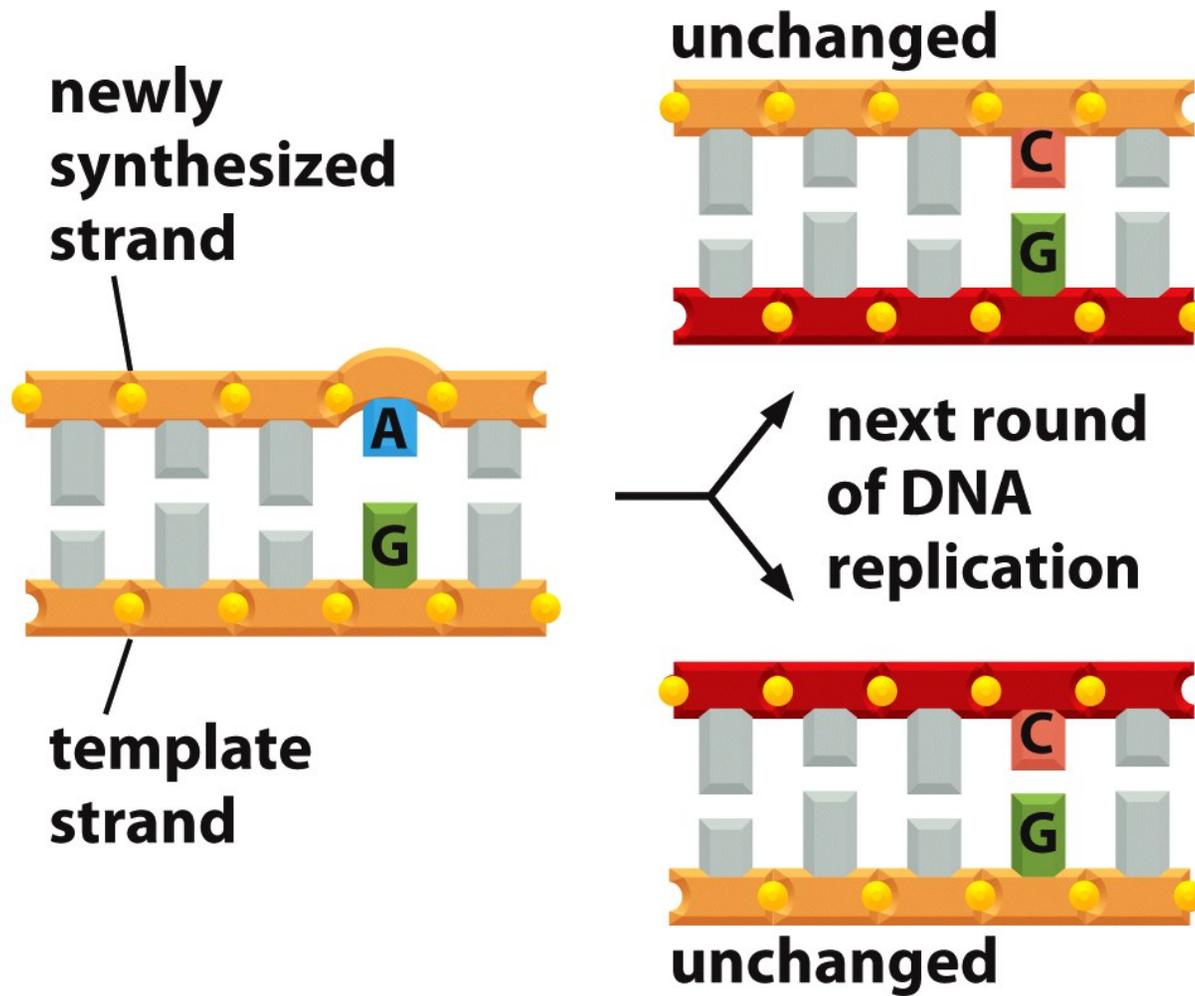


Figure 6-20 *Essential Cell Biology* (© Garland Science 2010)



EXCISION AND REPAIR OF ONLY THE NEWLY SYNTHESIZED STRAND

Figure 6-21c *Essential Cell Biology* (© Garland Science 2010)

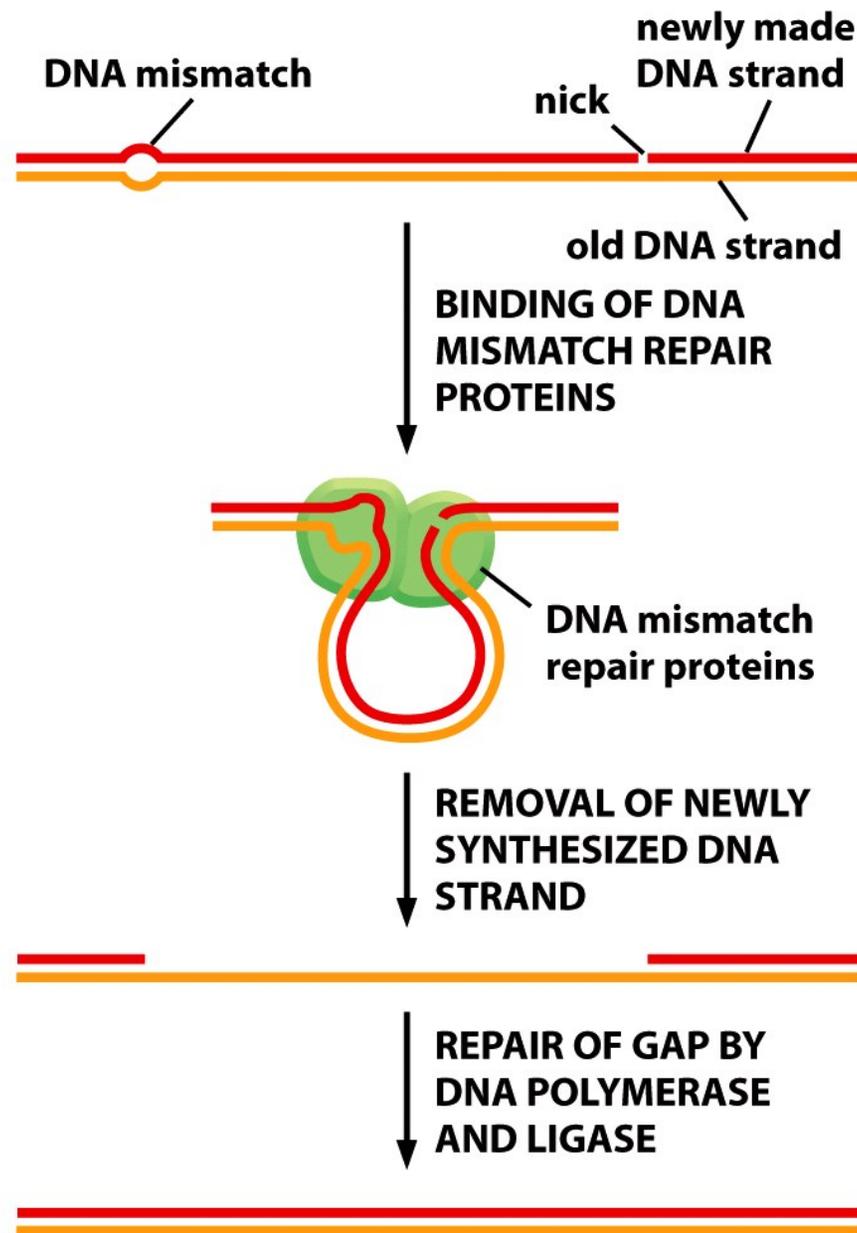


Figure 6-22 *Essential Cell Biology* (© Garland Science 2010)



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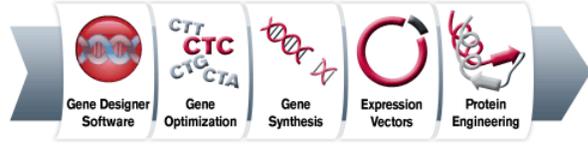
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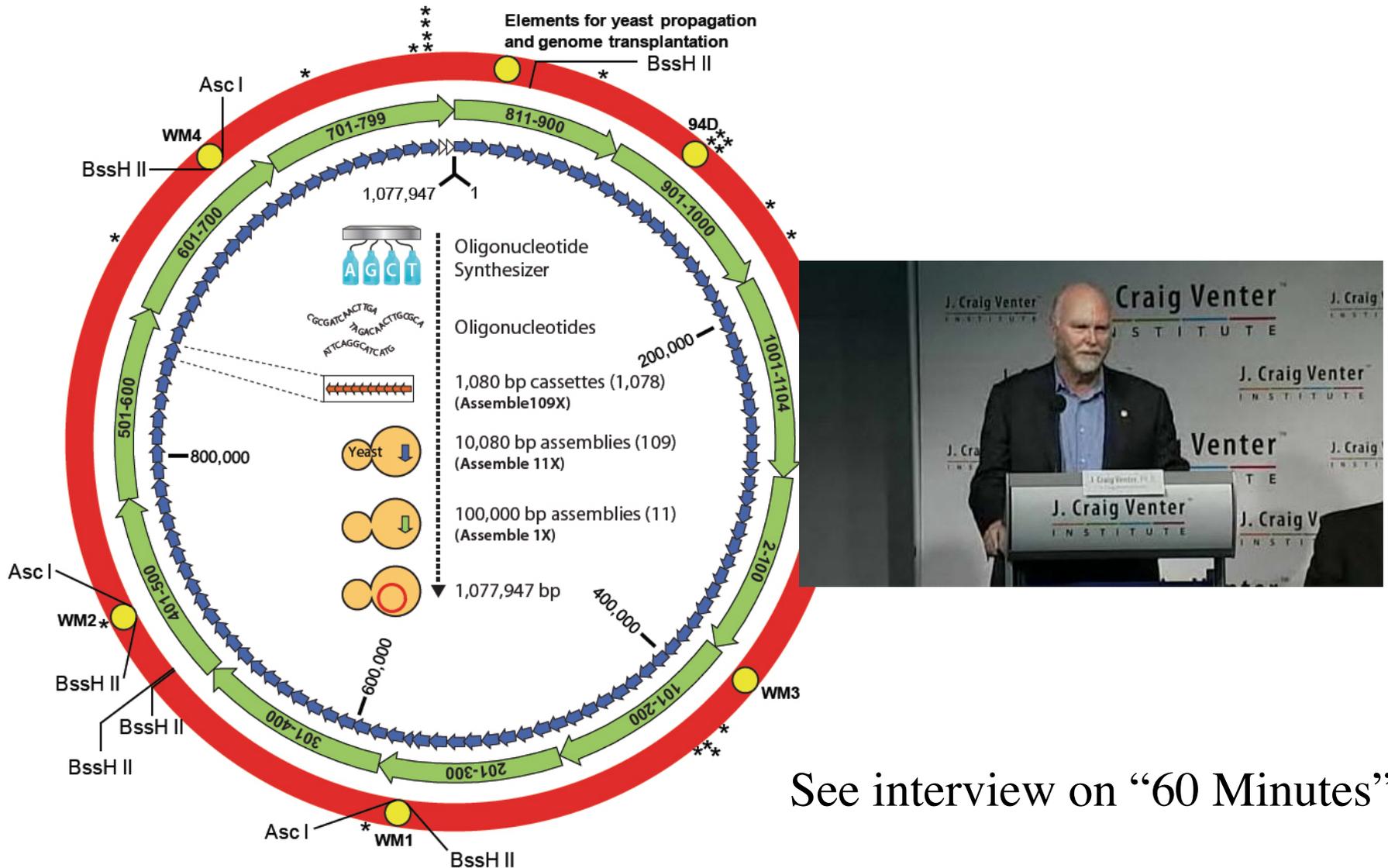
PepTalk 2012
San Diego, California
January 9-13, 2012

5th Annual Proteins Congress
London, UK
April 2-3, 2012

PEGS - The Essential Protein Engineering Summit
Boston, MA
April 30-May 4, 2012

The efficient synthesis of DNA has enabled synthesis of microbial genomes

The assembly of a synthetic *M. mycoides* genome in yeast



See interview on “60 Minutes”

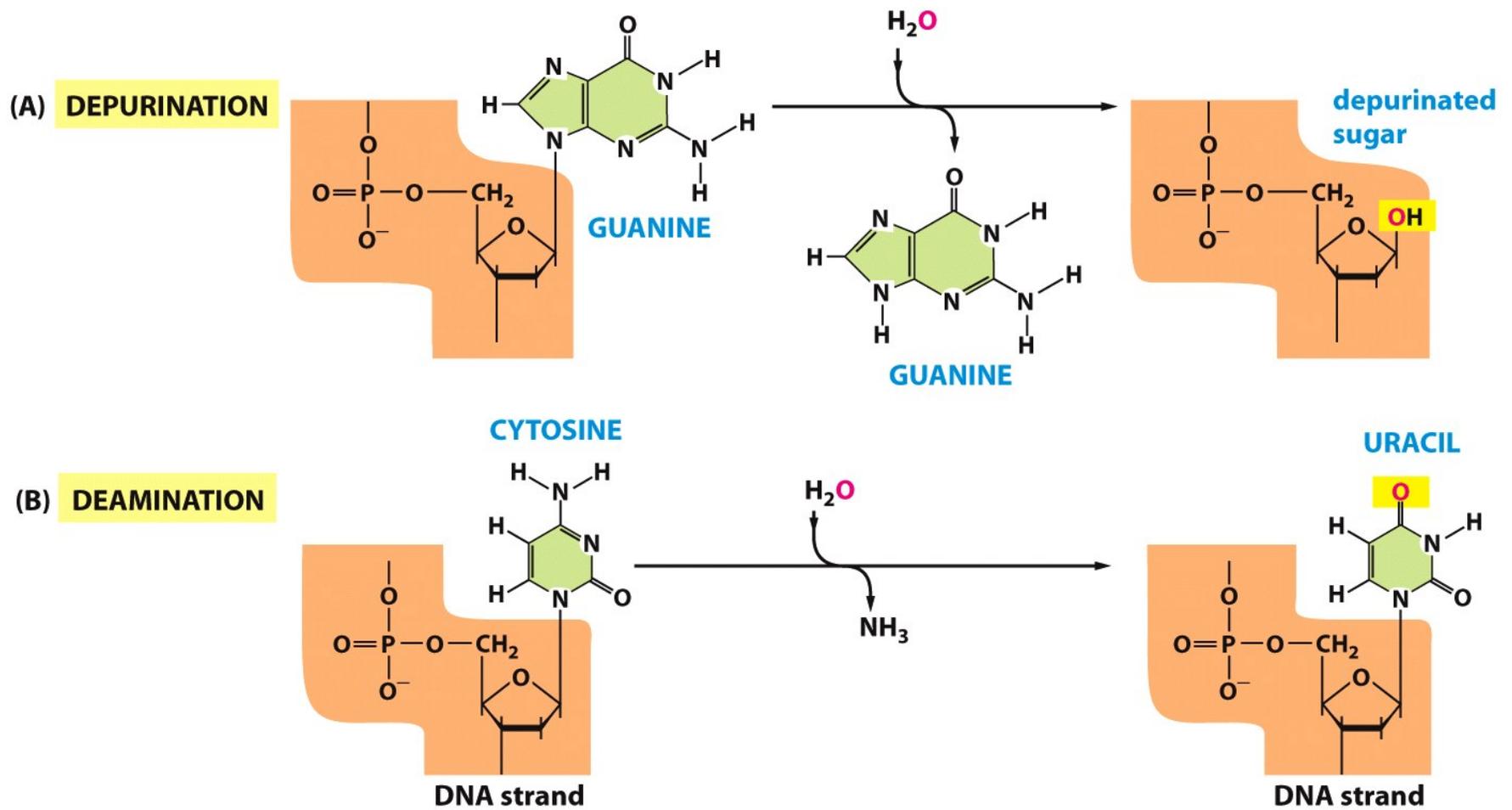


Figure 6-23 *Essential Cell Biology* (© Garland Science 2010)

Wear a hat with a wide brim



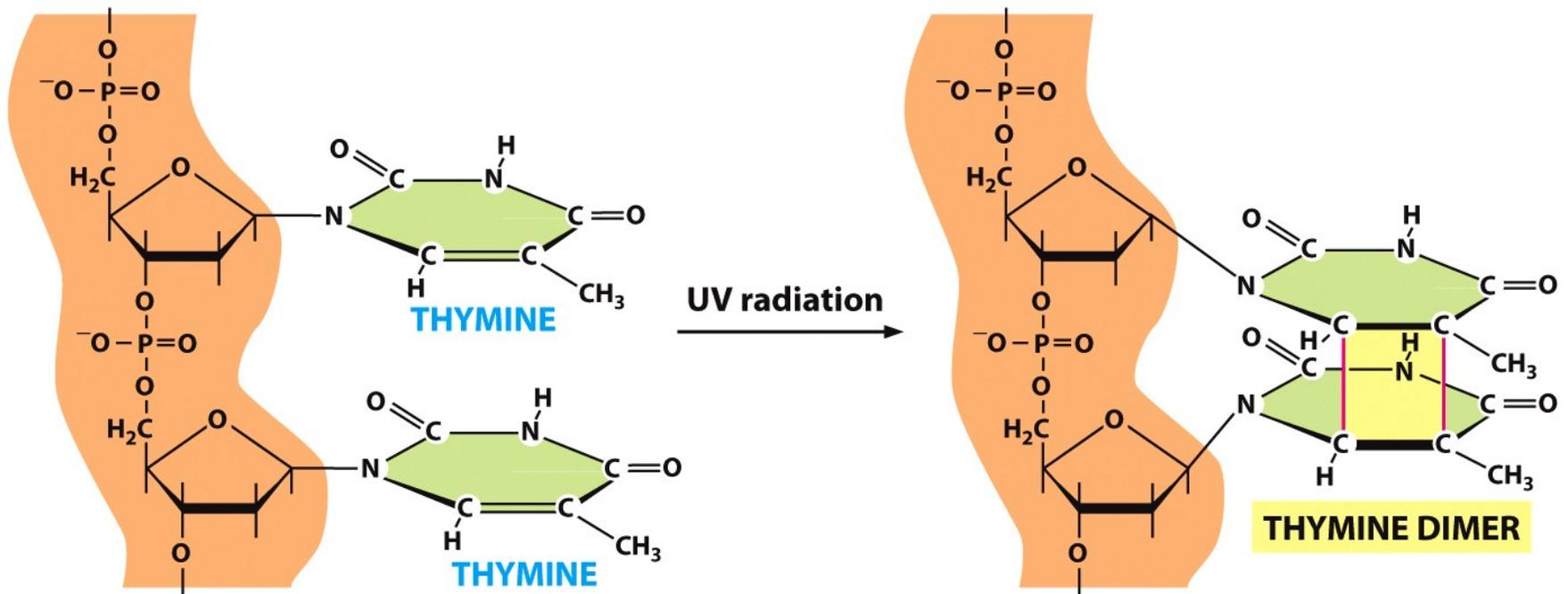


Figure 6-24 *Essential Cell Biology* (© Garland Science 2010)

Deamination of Cytosine Yields Uracil and a permanent G->A mutation

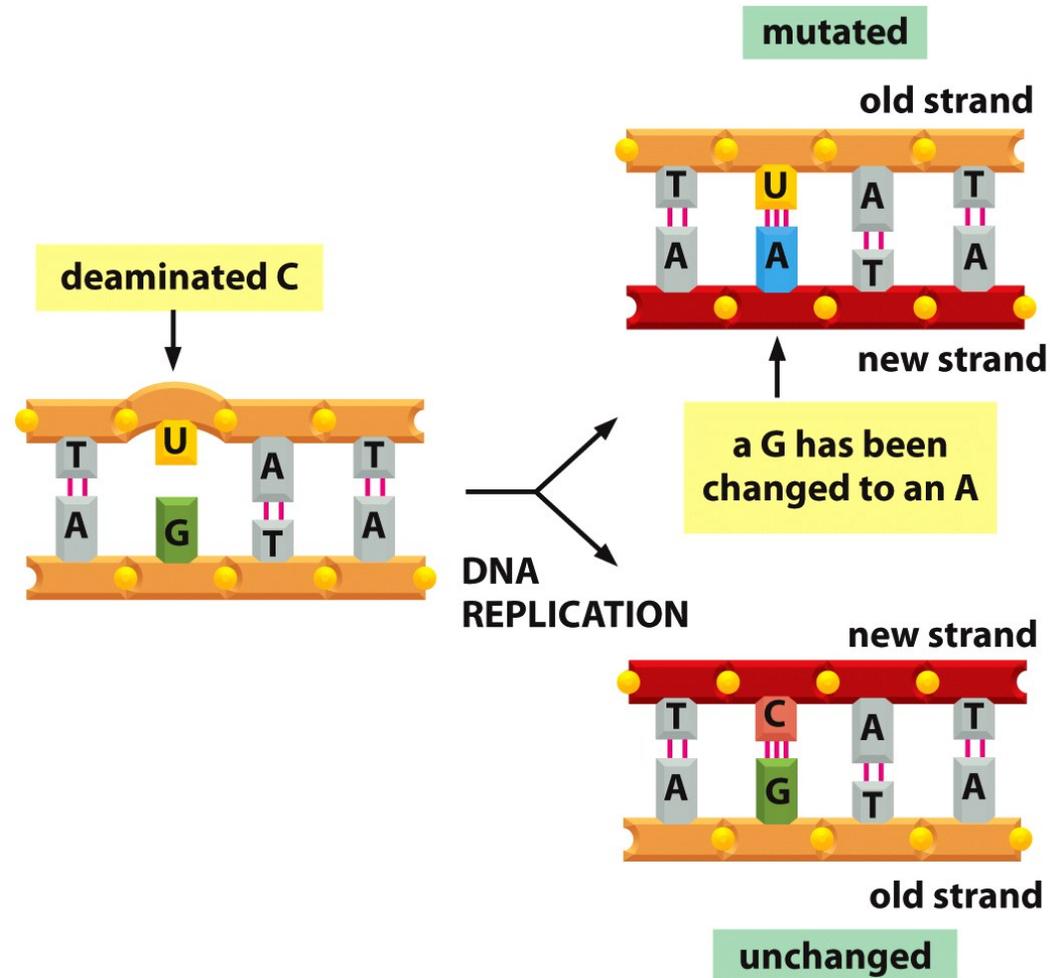


Figure 6-25a *Essential Cell Biology* (© Garland Science 2010)

Depurination results in base-pair deletion

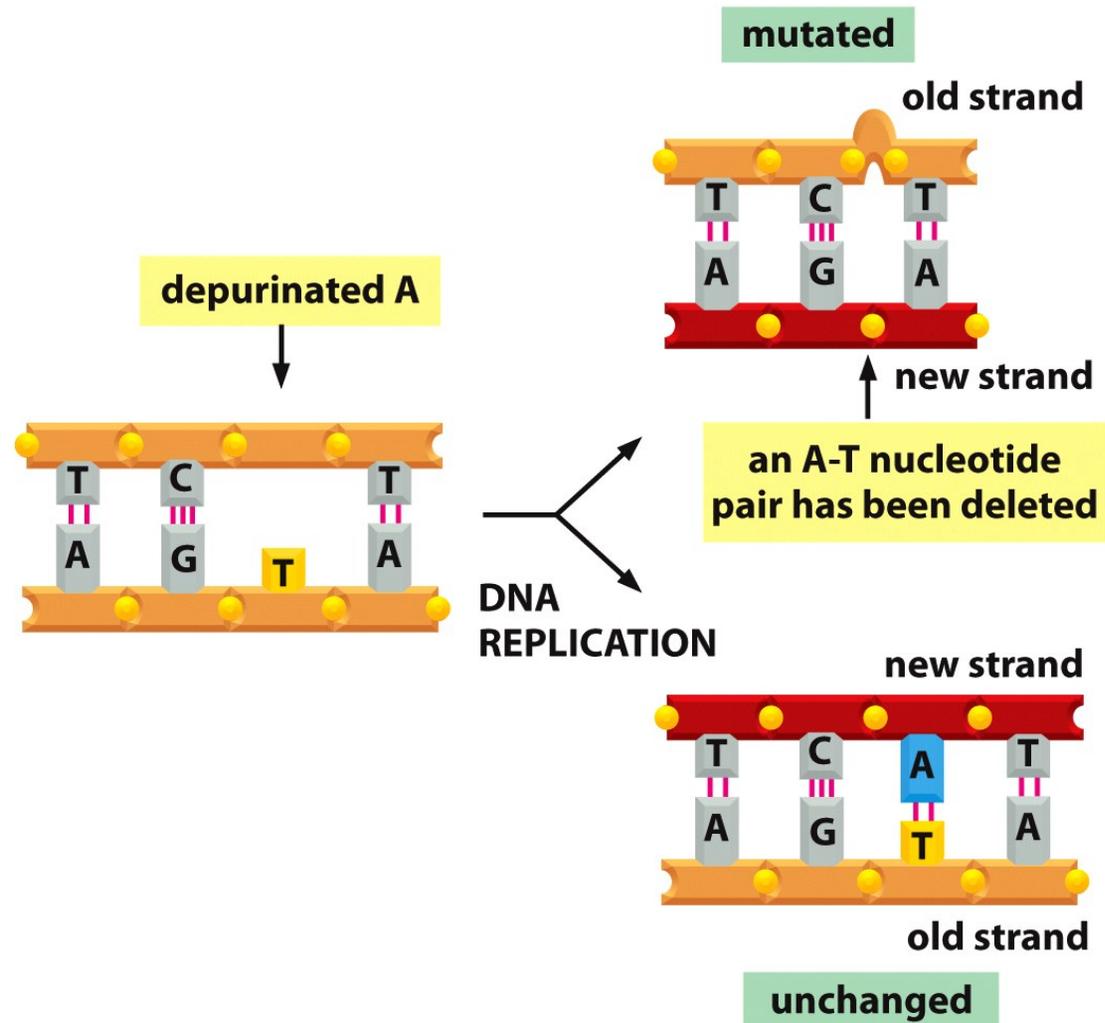


Figure 6-25b *Essential Cell Biology* (© Garland Science 2010)

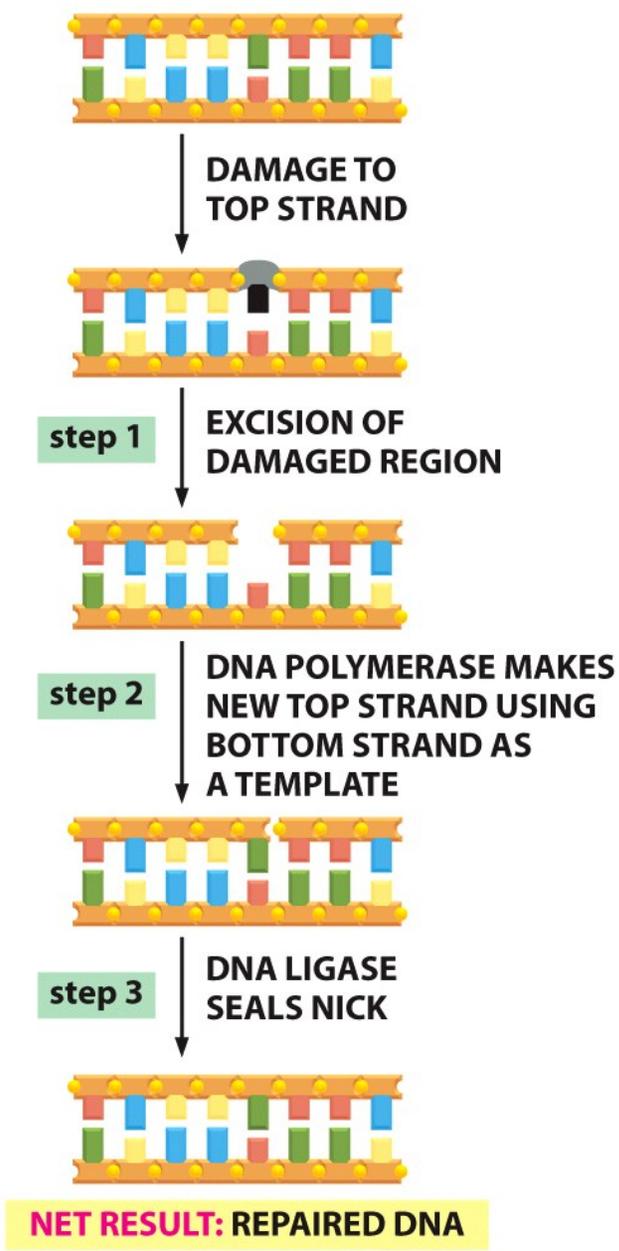
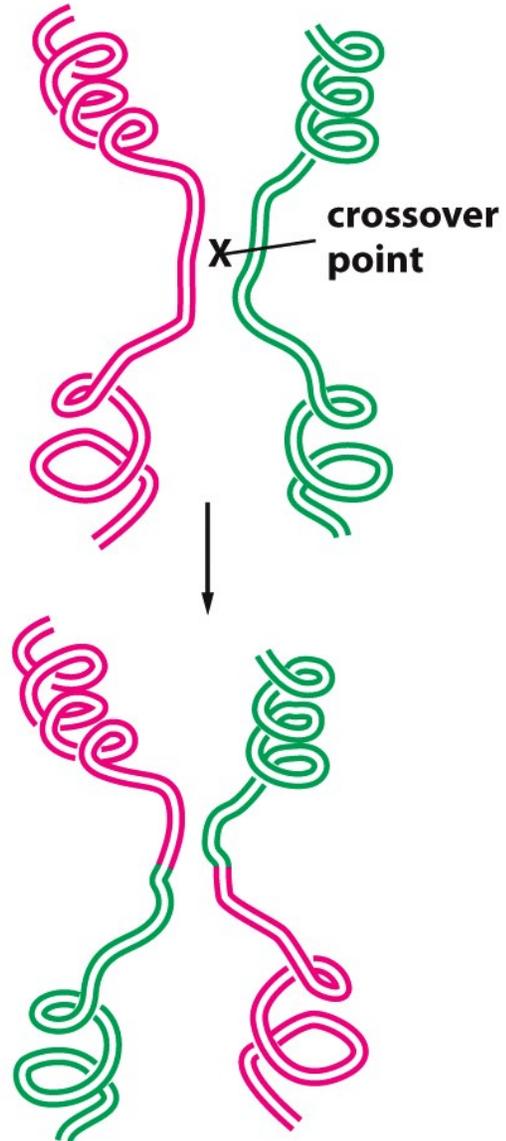
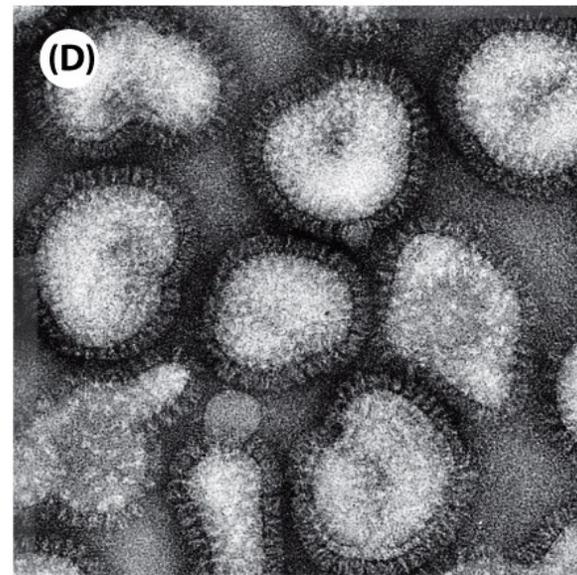
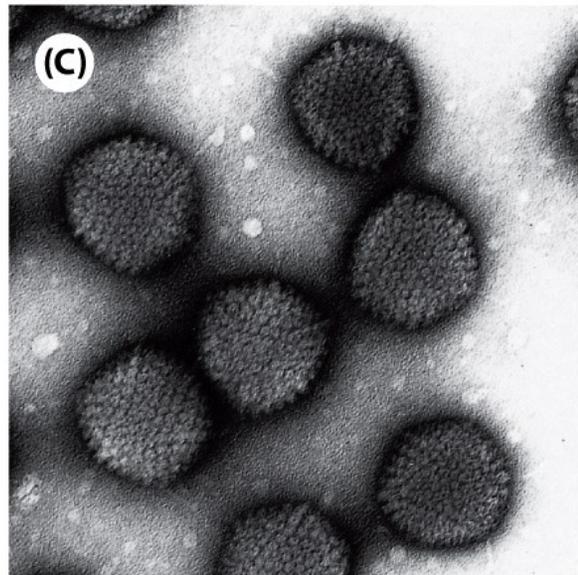
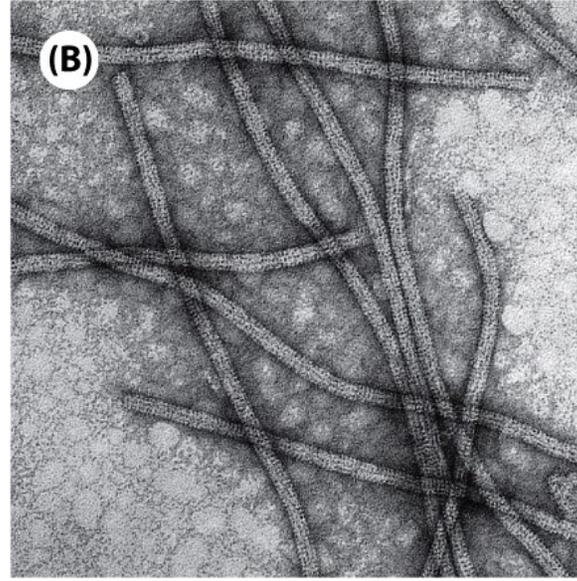
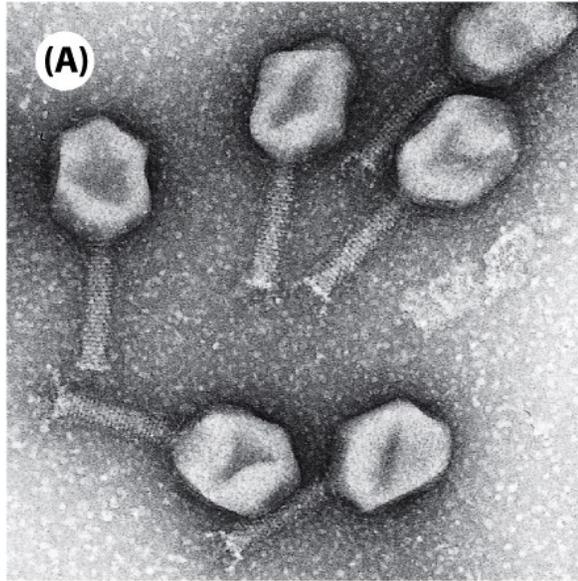


Figure 6-26 *Essential Cell Biology* (© Garland Science 2010)

two homologous DNA double helices



DNA molecules that have crossed over



100 nm

Figure 6-37 *Essential Cell Biology* (© Garland Science 2010)

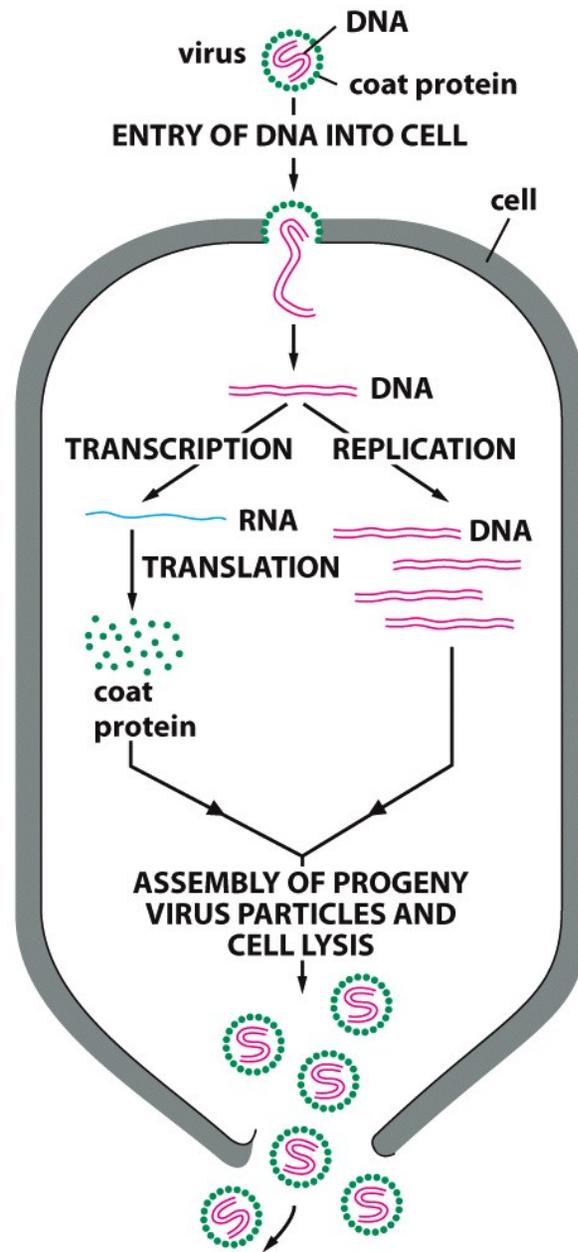


Figure 6-36 *Essential Cell Biology* (© Garland Science 2010)

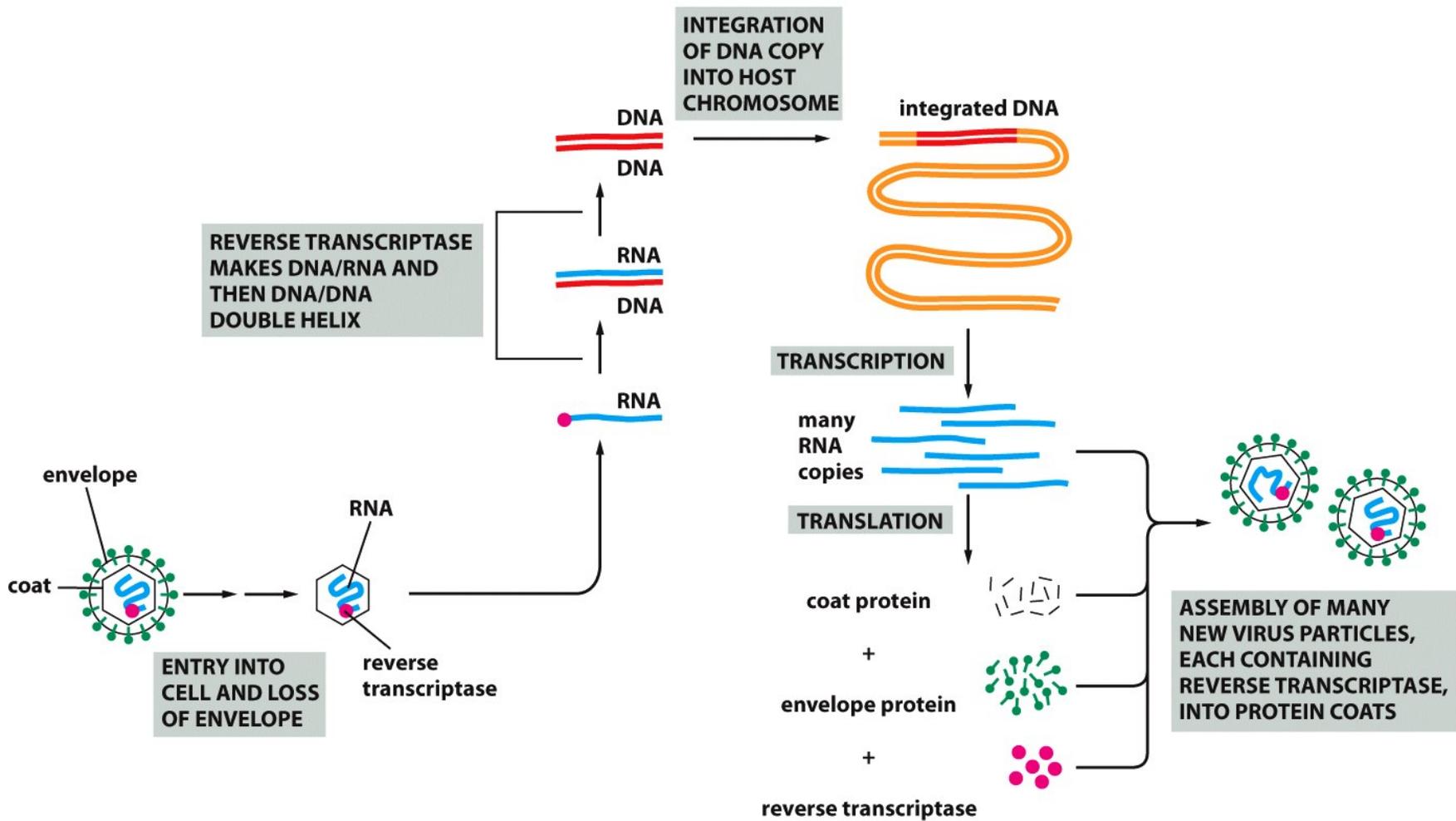


Figure 6-38 *Essential Cell Biology* (© Garland Science 2010)