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FUNDAMENTAL MOLECULAR GENETIC MECHANISMS

REVIEW THE CONCEPTS

1. Watson-Crick base pairs are the interactions between a larger purine and a smaller pyrimidine base in DNA. These interactions result in primarily G-C and A-T base pairing in DNA and A-U base pairs in double-stranded regions of RNA. They are important because they allow one strand to function as the template for synthesis of a complementary, antiparallel strand of DNA or RNA.
2. At 90°C, the double-stranded DNA template will denature and the strands will separate. As the temperature slowly drops below the T_m of the plasmid DNA, the single-stranded oligonucleotide primer present at higher concentration than the plasmid DNA strands hybridizes to its complementary sequence on the plasmid template. The resulting molecules contain a short double-stranded stretch the length of the primer with a free 3' OH that can be used by DNA polymerase enzyme in sequencing reactions.
3. RNA is less stable chemically than DNA because of the presence of a hydroxyl group on C-2 in the ribose moieties in the backbone. Additionally, cytosine (found in both RNA and DNA) may be deaminated to give uracil. If this occurs in DNA, which does not normally contain uracil, the incorrect base is recognized and repaired by cellular enzymes. In contrast, if this deamination occurs in RNA, which normally contains uracil, the base substitution is not corrected. Thus, the presence of deoxyribose and thymine make DNA more stable and less subject to spontaneous changes in nucleotide sequence than RNA. These properties might explain the use of DNA as a long-term information-storage molecule.