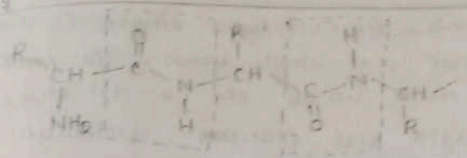
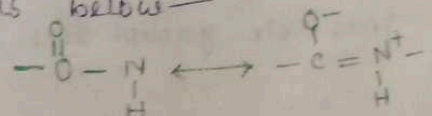


A compound composed of two amino acids linked together by one peptide bond is called a dipeptide — of three amino acids, a tripeptide, and so on. Long, unbranched chains of amino acids can be linked with (together) by peptide bonds to form oligopeptides (upto 25 amino acid residues). Conventionally peptide chains are written down with the free α-amino group on the left and the free α-carboxyl group on the right and a hyphen between the amino acids to indicate the peptide bonds. For ex, the tripeptide $^{+}H_3N$-serine-leucine-phenylamine-COO^{-} would be written simply as Ser-Leu-Phe or S-L-P.

The peptide bond between carbon and nitrogen exhibits partial double bond character due to the closeness of the carbonyl carbon-oxygen double bond allowing the resonance structure as below —



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Because of this, the C-N bond length is also shorter than normal C-N single bonds. The peptide unit which is made up of the CO-NH atoms is thus relatively rigid and planar, although free rotation can take place about the C_α-N and C_α-C bonds, i.e, the bonds either side of the peptide bond, permitting adjacent peptide units to be different angles. The hydrogen of the amino group is nearly always on the opposite side (trans) of the double bond to the oxygen of the carboxyl group, rather than on the same side (cis).

Classification of Proteins:—

Depending on solubility properties and on known chemical and physical differences, proteins are classified into two major groups — single proteins and conjugated proteins.

1. **Simple proteins**:— They are compounds that on hydrolysis, yield only amino acids. On the basis of solubility properties simple proteins c be further divided into six groups as belo

C. DNA pol III :

This enzyme was discovered by T. Kornberg and M.L. Gefter in 1972. It is largest, most complex and most active polymerase enzyme out of three. Molecular weight = 9,00,000 and consist of 18-20 subunits. Because it role as primary role in replication, so it is referred as replicase. It is formed of single catalytic subunit (α-subunit). Some of these subunit are β, γ, δ, ε, θ and ζ. β-subunit of polymerase-III recognise and bind to the primer strand of parental DNA. It is also called copolymerase-III. The polymerizing and proof reading activities reside in subunit α and ε respectively. The subunit associates with α and ε to form the core polymerase enzyme.

ii) Helicase :

Helicase are defined as a class of enzyme

that catalyse the separation of duplex nucleic acid into single strand in an ATP-dependent reaction and function in DNA modification, processing, including replication, DNA repair, transcription, translation and many other nucleic acid related processes.

→ Helicase is the enzyme that unwind the DNA double helix by breaking the H-bond down the center of strand. It begins at a site called ORI and it create a replication fork by separating two sides of the parental DNA.

iii) Gyrase:

→ An enzyme that changes the no of times the two strand in a closed DNA molecule cross each other. It does this by cutting the DNA, passing DNA through the break, and resealing the DNA.

→ It belong to a class of enzymes known as topoisomerase that are involved in the control of topological transition of DNA

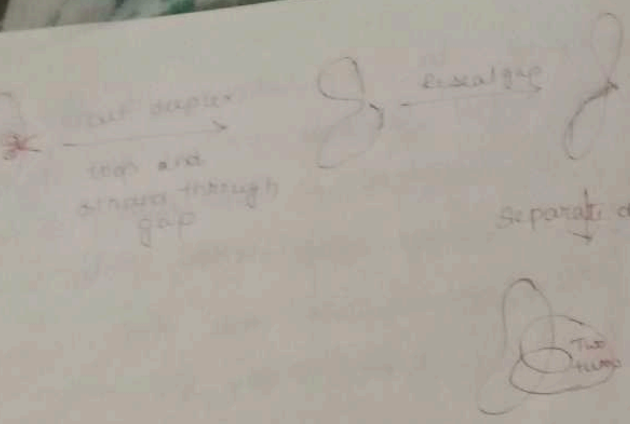

Fig DNA gyrase act as cutting, to break, resealing

iv) Primase:-

A type of RNA polymerase that synthesize short segment of RNA that used as primer for DNA replication.

→ It is an enzyme create a primer on a DNA strand by adding RNA nucleotide to the strand a/c to DNA template sequence. This process occurs during DNA replication.

7) Ligase :

→ Enzyme that function like molecular glue, binding the separate DNA together

→ DNA ligase seals the 'nick' between Okazaki fragments converting them to a continuous strand of DNA

→ Covalently closed the nicks in double stranded DNA

8) Single stranded binding protein (SSBP) :

→ Accessory replication protein lacking enzymatic activity, but required for efficient activity of other enzyme in the replisome

→ It bind to the single stranded part of the each DNA strand preventing the strand from reasso-ciating and shielding them from degradation of nuclease.

→ In E. Coli and eukaryotes protein is called SSB, and interacts with primase to help specific priming activity

→ The strand separated by holding them in place so that each strand can serve as a template

for new DNA synthesis.

RNA priming / Formation of RNA primer:

The primase enzyme (also called DNA directed RNA polymerase) binds to the first priming sequence on the leading strand and synthesis a short primer RNA segment at the origin of replication complementary to the separated strand of DNA. RNA primer is short, formed of 10 to 60 nucleotide only.

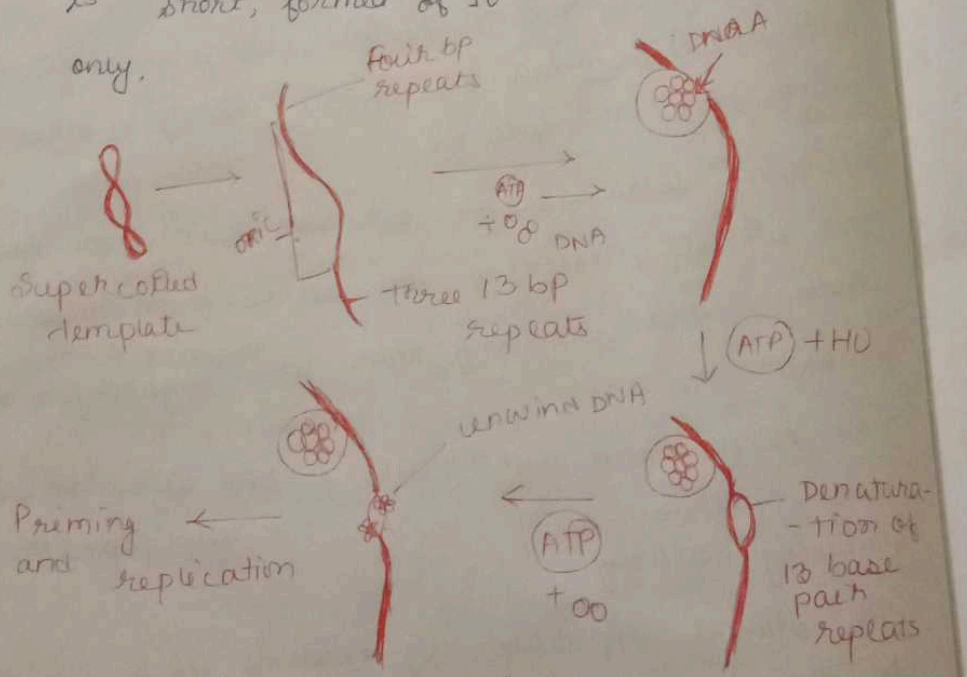

Fig: RNA priming.

Synthesis of RNA primer is essential because DNA polymerase can't initiate synthesis of new DNA strand but it can polymerise growth of DNA chain.