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ZOO505 CURRENT SOLVED
PAPERS

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ZOO-505

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1. What is ORF..? 2

The protein-coding region(s) of each mRNA is composed of a contiguous, nonoverlapping string of codons called an open reading frame (commonly known as an **ORF**).

2. What is RNA splicing..?

intron-containing genes must have their introns removed before they can be translated into proteins.

The process of intron removal is called **RNA Splicing**.

It converts the premRNA into mature mRNA containing only exons.

RNA Splicing must occur with great precision to avoid the loss, or addition, of even a single nucleotide at the sites at which the exons are joined.

3. What is spliceosome..? 3

The transesterification reactions are mediated by a huge molecular “machine” called the **Spliceosome**.

This complex comprises about 150 proteins and five RNAs and is similar in size to a ribosome.

In performing even a single splicing reaction, the spliceosome hydrolyzes several molecules of ATP.

4. Write at least three loops tRNA..? 3

The ψ U Loop:

- It is so-named because of the characteristic presence of the unusual base ψ U in the loop. The modified base is often found within the sequence 5'-TCUCG-3'.

The D Loop:

- It takes its name from the characteristic presence of dihydrouridines in the loop.

The Anticodon Loop:

- As its name implies, contains the anticodon, a three-nucleotide-long sequence that is responsible for recognizing the codon by base pairing with the mRNA.

The Variable Loop:

- It sits between the anticodon loop and the ψ U loop and, as its name implies, varies in size from 3 to 21 bases.

5. What are transitions and transversions mutation explain with diagram..? 5

Transitions are pyrimidine-to-pyrimidine and purine-to-purine substitutions, such as thymine (T) to cytosine (C) and adenine (A) to guanine (G).

Transversions are pyrimidine-to-purine and purine-to-pyrimidine substitutions, such as T to G or A and A to C or T.

The diagram illustrates the classification of point mutations based on the chemical nature of the bases involved. It shows four bases arranged in a square: Adenine (A) at the top-left, Cytosine (C) at the top-right, Thymine (T) at the bottom-left, and Guanine (G) at the bottom-right. Red double-headed arrows connect A to G and C to T, representing transitions. Blue double-headed arrows connect A to C, A to T, C to G, and T to G, representing transversions.

6. Write a note on the elongation of transcription..? 5

Elongation

Once the RNA polymerase has synthesized a short stretch of RNA (10 bases), it shifts into the elongation phase.

During elongation, the enzyme performs an impressive range of tasks in addition to the catalysis of RNA synthesis.

1) It unwinds the DNA in front and reanneals it behind.

2) It dissociates the growing RNA chain from the template as it moves along.

3) And it performs the proofreading functions.

Recall that during replication, in contrast, several different enzymes are required to catalyze a similar range of functions.

Termination

7. Write the elements of Pol II core promoter..?

The elements found in Pol II **core promoter** include the TFIIB recognition element (BRE), the TATA element (or box), the initiator (Inr), and the downstream promoter elements (known as DPE, DCE, and MTE).

8. Write the name of polymerases found in Eukaryotes included plants..?

whereas eukaryotic cells have three: RNA polymerases I, II, and III (RNA Pol I, II, and III).

- Recently, two more DNA-dependent RNA polymerases have been identified in recent years, and have been called as Pol IV and Pol V.
- These are found only in plants, where they transcribe small interfering RNAs.

9. Write a detail note on DNA mutation..? 10

- DNA mutation can be defined as a permanent transmissible change in the genetic material (DNA/RNA).
- In other words, it is a permanent change in the nucleotide sequence of the genome of an organism.
- DNA can be easily damaged even under normal physiological conditions.
- Many different kinds of chemical and physical agents can damage DNA.
- Some of these agents are endogenous which are produced inside the cells as a result of normal metabolic pathways.
- While some others are exogenous agents which come from the surrounding environment.

- On one hand, DNA stability is required to ensure that the genetic information may pass accurately from one generation to the next
- It is also required for the correct functioning of thousands of genes.
- On the other hand the genetic variation is needed to drive evolution.
- If this variation would be lacking, the new species, including humans, would have not arisen.
- So the life and biodiversity depend on a happy balance between DNA damage (mutation) and its repair.

- DNA mutations may be very simple (single base change) or very complex and may include several thousands of nucleotides.
- The simplest mutations are switches of one base for another. There are two kinds of such mutations which include:-
 - Transitions**

○ Transversions

- Transitions are pyrimidine-to-pyrimidine and purine-to-purine substitutions, such as thymine (T) to cytosine (C) and adenine (A) to guanine (G).
- Transversions are pyrimidine-to-purine and purine-to-pyrimidine substitutions, such as T to G or A and A to C or T.

Other simple mutations are insertions or deletions of a nucleotide or a small number of nucleotides.

- All such mutations that alter a single nucleotide are called **point mutations**.
- Other kinds of mutations cause more drastic changes in DNA, such as extensive insertions and deletions and gross rearrangements of chromosome structure.

10. Write the names of three classes of RNA splicing found in the cell..?

- There are total three classes of splicing found in the cells:-
 - Nuclear pre-mRNA**
 - Group II introns**
 - Group I introns**

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