

SHORT QUESTION ANSWERS

(RESTRICTION ENZYME)



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Q. Name the category of enzymes that cut at a specific site within the DNA molecule. Give an example. Explain how do these enzymes functions. Mention their use in genetic engineering

Answer

Genetic engineering is the process of making changes in the DNA of an organism resulting in the desired organism. The enzymes that are widely used in genetic engineering are restriction enzymes they may be endonucleases (cuts the DNA strand in between) and exonucleases (cuts the DNA strand at the end).

They are also called as 'Molecular scissors' as they cut DNA molecule at specific sites. E.g., EcoRI is a restriction enzyme that cuts the DNA molecule only at adenine and guanine bases. These enzymes have a specific restriction site on them which cuts the DNA molecule from these particular restriction sites only. There are different restriction enzymes for different restriction sites. They are very useful in genetic engineering as they cut the DNA strand at particular where desired DNA or gene are added and attached by another enzyme DNA ligase which results in the formation of the desired organism.

Q. Write the names of two endonuclease enzymes.

Answer

A restriction enzyme (or restriction endonuclease) is an enzyme that cuts DNA at or near specific recognition nucleotide sequences known as restriction sites. EcoRI is the restriction enzyme isolated from *Escherichia coli*. The recognition site for this enzyme is GAATTC. BamHI is isolated from *Bacillus amyloliquifaciens*. The recognition site for this enzyme is G^AGATTC.

Q. Which of the following is not true for type 1 restriction endonuclease?

Answer:

Methylation and cleavage occurs in the same sequence

Explanation: Type 1 restriction endonuclease recognizes and cleaves at different points. While it methylates at the recognition sequence, the cleavage could be as far as 1000bp. Also both these processes require ATP.

Q. Restriction endonucleases can recognize as

Answer:

Restriction endonuclease will recognize the pallindromic sequences. GATC is one of such pallindromic sequence but not the only one, and this is very specific.

Q. The Mg^{2+} ion in restriction endonuclease is not bound to

Answer:

Histidine

Explanation: In restriction endonucleases we don't have His as a ligand to the central metal ion Mg^{2+} . While it's binding to the other groups assists in the nucleophilic attack

Q. When the DNA enzyme interacts with the cognate DNA, there is

Answer: Reduction in free energy

Explanation: On restriction endonuclease binding to cognate DNA there is a reduction in free energy to a greater extent than that in case of non-cognate DNA. This additional energy is used to distort the sequence and produce a kink.

Q. Which class of plasmids assists in the production of bacteriocins?

Answer:

Col plasmids help in the production of colicins and bacteriocins. This helps them to kill other bacteria. While F plasmids confer fertility and R confers resistance to some antibiotics.

Q. In an experiment you want to express your gene of interest in a prokaryote through a plasmid. What would be your ideal copy number?

Answer: 2-3

Explanation: The gene of interest by us should always be expressed in low copy number as if it is in higher copy number it will use more of bacterial resources without helping them at all. So, bacteria might then dispense some of these chromosomes

Q. Which of the plasmids fit the definition of episomes?

Answer:

Episomes are the plasmids that can get incorporated in a central chromosome. F factors or fertility factor is one such plasmid.

THANK
YOU