

## Chapter: BIOTECHNOLOGY AND ITS APPLICATIONS

### Exercise

**Question 1.** Crystals of Bt toxin produced by some bacteria do not kill the bacteria themselves because –

- (a) bacteria are resistant to the toxin
- (b) the toxin is immature:
- (c) the toxin is inactive:
- (d) bacteria encloses toxins in a special sac.

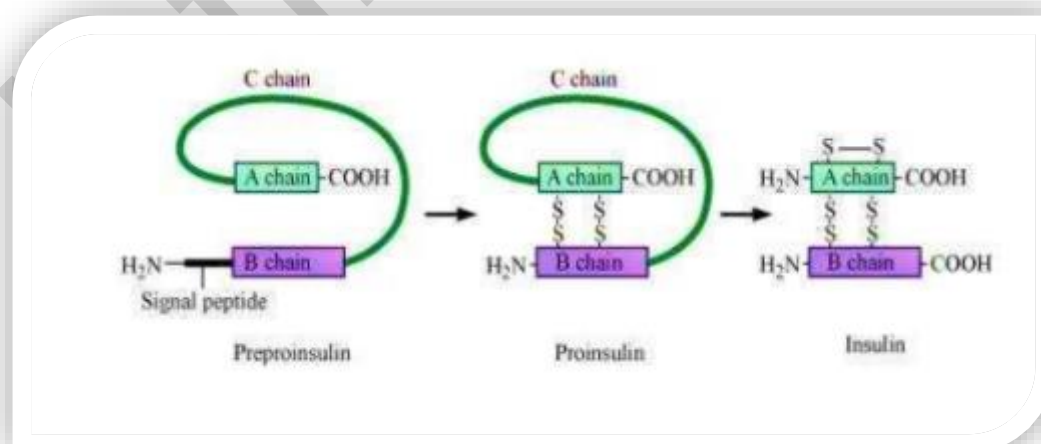
**Answer:** (c)

(c) Poison is inactive:

The poison is present in bacteria in an inactive form known as an unfavorable abiotic to the proto poison, which is transformed to an active form when it enters the body of a nonentity.

**Question 2.** What are transgenic bacteria? Illustrate using any one example.

**Answer:** A foreign gene has been purposefully introduced into the genome of transgenic bacteria. They're modified to express the desired gene for the production of colorful, commercially significant items. E.coli is an example of transgenic bacteria. The two DNA sequences corresponding to the A and B chains of mortal insulin are inserted into the plasmid of E.coli to form the distinct mortal insulin chains. As a result, after the insulin gene is inserted into the bacteria, it becomes transgenic and begins making fatal insulin chains. Later, E.coli toe chains are extracted and joined to create deadly insulin.



**Question 3.** Compare and contrast the advantages and disadvantages of the production of genetically modified crops.

**Answer:** The produce of genetically modified (GM) or transgenic plants have several advantages:

- Utmost of the GM crops has been developed for pest resistance, which increases the crop productivity and thus, reduces the reliance on chemical pesticides.
- multiple kinds of GM food crops have been developed, which have enhanced nutritious quality. For exemplification, golden rice is a transgenic variety of rice, which is rich in vitamins.
- These plants help the loss of fertility of the soil by boosting the efficacy of the mineral operation.
- They're largely tolerant to unfavorable abiotic conditions.
- The usage of GM crops reduces crop loss after harvesting.

Still, there are certain difficulties regarding the use of genetically modified crops around the world. The use of these crops can have an impact on an area's native biodiversity. For illustration, the use of Bt bane to drop the amount of germicide is posing trouble for salutary nonentity pollinators analogous to the honeybee. However, also the honey freak might be affected If the gene expressed for Bt bane gets expressed in the pollen. As a result, the process of pollination by honey sundries would be affected.

Also, genetically modified crops are affecting mortal health. Allergens and antibiotic resistance markers are delivered to the body by them. They can also pass on contaminants to the crop shops' wild relatives. As a result, it has an impact on the natural landscape.

**Question 4. What are Cry proteins? Name an organism that produces it. How has man exploited this protein to his benefit?**

**Answer:** Cry genes are responsible for decrypting cry proteins. Bacillus thuringiensis bacteria produce these proteins, which are venoms. These proteins are present in these bacteria in their inactive state. The alkaline pH of the gut kicks off the inactive bane protein when it is consumed by a nonentity.

This causes epithelial cells to lyse and, finally, the nonentity to die. As a result, man has used this protein to create transgenic crops with nonentity resistance, such as Bt cotton and Bt sludge.

**Question 5. What is gene therapy? Illustrate using the example of adenosine deaminase (ADA) deficiency.**

**Answer:** Gene therapy: Gene therapy is a branch of medicine that focuses on genetically altering cells to provide a therapeutic effect or heal disease by repairing or reconstructing damaged genetic material.

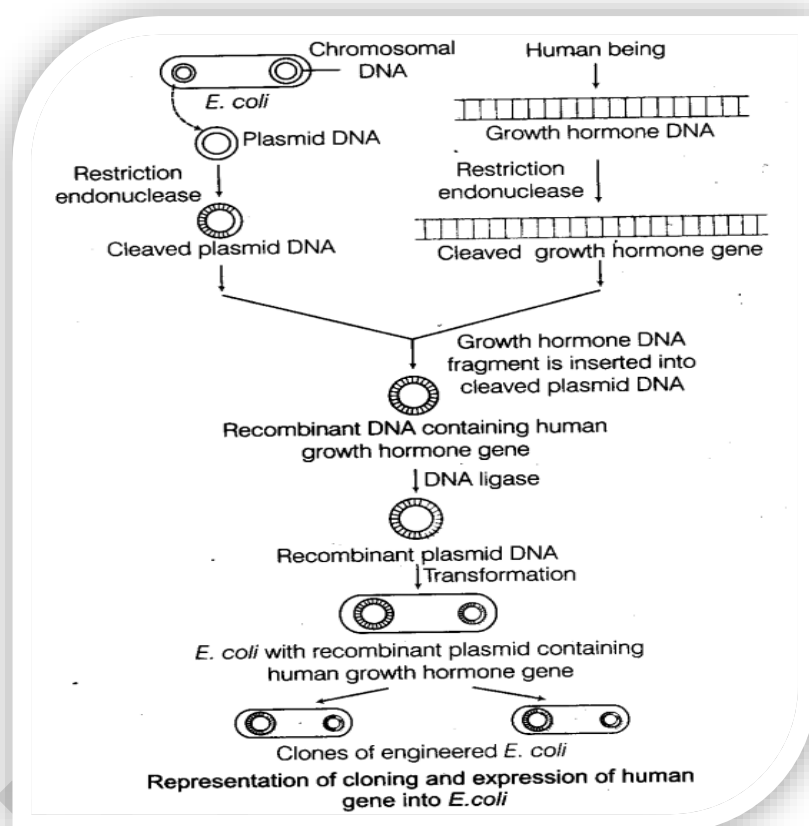
A Gene rectifier is a tactic for correcting a defective gene through gene manipulation. It involves the delivery of a normal gene into the individual to replace the defective gene, for exemplification, the preface of the gene for adenosine deaminase (ADA) in ADA is incomplete existent.

Also, a functional gene for ADA is introduced into lymphocytes with the help of retrovirus. These treated lymphocytes containing the ADA gene are also introduced into the patient's bone marrow. Therefore, the gene gets activated producing functioning T-lymphocytes and cranking the case's immune system.

**Question 6. Diagrammatically represent the experimental steps in cloning and expressing a human gene (say the gene for growth hormone) into a bacterium like *E. coli*?**

**Answer:** DNA cloning is a tactic of producing multiple identical clones of specific template DNA.

It involves the use of a vector to carry the specific foreign DNA scrap into the host cell. The operation of cloning and transfer of the gene for neoplasm hormone into *E. coli* is characterized below.



**Question 7. Can you suggest a method to remove oil (hydrocarbon) from seeds based on your understanding of rDNA technology and chemistry of oil?**

**Answer:** Recombinant DNA technology (rDNA) is a technique for modifying an organism's genetic material to achieve the desired result. This method, for example, is used to remove oil from seeds. Glycerol and adipose acids are the main components of the oil. By preventing the formation of either glycerol or adipose acids, one can obtain oil from fewer seeds via rDNA. This is performed by removing the gene that controls synthesis.

**Question 8. Find out from the internet what is golden rice.**

**Answer:** Golden rice is a genetically modified cultivated rice variety that has been produced as a fortified diet for areas where vitamin A deficiency is a problem. It contains beta-carotene, a pro-vitamin A precursor that was inserted into the rice through gene splicing. The rice factory's leaves naturally create beta carotene pigment. Nonetheless, it is not present in the sperm of the seed. This is because the beta-carotene pigment aids in photosynthesis, whereas photosynthesis does not occur in the endosperm. Because beta-carotene is a precursor to professional vitamin A, it is added to rice varieties to make up for a vitamin A deficiency. It's a straightforward and less expensive alternative to vitamin supplements. Activists on the ground, however, have been vocal in their resistance to this type of rice. As a result, they are still unavailable for mortal consumption in the commercial world.

**Question 9. Does our blood have proteases and nucleases?**

**Answer:** Enzymes, nucleases, and proteases are not found in human blood. The serum in citizens contains many forms of protease inhibitors, which keep blood proteins from being weakened by proteases. Nucleases are enzymes that catalyze the breakdown of nucleic acids not found in the bloodstream.

**Question 10. Consult the internet and find out how to make orally active protein pharmaceuticals. What is the major problem to be encountered?**

**Answer:** Biologically active components such as peptides or proteins, antibodies, and polymeric beads are found in orally-active protein medicines. Various formulations are used to provide it orally into the body. It entails encapsulating protein or peptides in liposomes or formulations with penetration enhancers.

These proteins or peptides are used for the treatment of varied diseases and also are used as vaccines. However, the oral administration of those peptides or proteins has some problems associated with them. Once these proteins are ingested, the proteases present within the stomach juices denature the protein. As a result, their effect is going to be nullified. Hence, it's necessary to guard the therapeutic protein against digestive enzymes, if taken orally. This is often the rationale for the proteins to be injected directly into the target site.