

Edexcel (B) Biology A-level

7.4 - Gene technology

Flashcards

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What is meant by recombinant DNA technology?



What is meant by recombinant DNA technology?

The transfer of DNA fragments from one organism to another.



Why does recombinant DNA technology work?



Why does recombinant DNA technology work?

Because the genetic code is universal, and therefore transcription and translation occur by the same mechanism and result in the same amino acid sequence across organisms.



Summarise the process of using reverse transcriptase to produce DNA fragments.



Summarise the process of using reverse transcriptase to produce DNA fragments.

mRNA complementary to the target gene is used as a template. It is mixed with free nucleotides which match up to their base pairs, and reverse transcriptase which forms the sugar-phosphate backbone, to create cDNA (complementary DNA).



Summarise the process of using enzymes to produce DNA fragments.



Summarise the process of using enzymes to produce DNA fragments.

Restriction endonucleases (RE) cut DNA at specific sequences. Different REs cut at different points, but one RE will always cut at the same sequence. Therefore using particular REs allows you to cut out a certain gene of interest.



Give ways in which recombinant DNA
can be inserted into other cells.



Give ways in which recombinant DNA can be inserted into other cells.

- Virus vectors
- Gene guns



Summarise the process of inserting a DNA fragment into a vector.



Summarise the process of inserting a DNA fragment into a vector.

A plasmid (circular DNA from a virus) is used as the vector, and is cut using the same restriction enzymes as the DNA, so that the ends are complementary. DNA ligase joins the fragment and plasmid together.



Summarise the process of inserting a vector into a host cell.



Summarise the process of inserting a vector into a host cell.

Known as cell transformation. The host cells (bacteria) are mixed with the vectors in an ice-cold solution, then heat shocked to encourage the cells to take up the vectors. The cells can then be grown and the DNA fragment will be cloned.



Describe how gene guns work.



Describe how gene guns work.

Microscopic gold pellets are coated with copies of the DNA fragment, which are then propelled at high speed into cells.



Describe a way to identify recombinant cells.



Describe a way to identify recombinant cells.

Marker genes can be inserted into plasmids at the same time as DNA fragments e.g. antibiotic resistance genes. The transformed cells are then placed on a plate with antibiotics, so only the ones that successfully took up the vector will grow.



What are 'knockout mice' and how are they useful?



What are 'knockout mice' and how are they useful?

Mice with one or more genes silenced. Can be used to investigate gene function, or create animal models of disease to allow research and testing of treatments.



What is meant by transgenic plants?



What is meant by transgenic plants?

Genetically modified plants, which contain genetic material from an unrelated organism.



Explain the process of producing transgenic plants.



Explain the process of producing transgenic plants.

Plasmid extracted from bacterium, gene inserted, and then returned. Plant is then infected with the bacteria. This will produce a gall, containing cells that contain the inserted gene. These cells can be used to grow a whole new plant.



Give an example of a genetically modified plant and the benefits of this.



Give an example of a genetically modified plant and the benefits of this.

Soya beans. Linoleic acid (polyunsaturated) is replaced by oleic acid (monounsaturated). This is oxidised less easily and so prolongs shelf life, as well as being healthier.



Give some advantages of the widespread use of genetic modification.



Give some advantages of the widespread use of genetic modification.

- Improve nutritional value of foods
- Greater crop yields
- Less need for pesticides
- Reduces need for land clearing



Give some disadvantages of the widespread use of genetic modification.



Give some disadvantages of the widespread use of genetic modification.

- Reduced biodiversity.
- Unknown effects on health.
- Cross-pollination could result in herbicide-resistant weeds.
- May increase costs for farmers.

