

What steps are involved in sequencing the genome of an organism?

Genome mapped. Samples sheared. Sections placed into BAC then E.Coli (BAC cells cultured, DNA Extracted and cut, separated, sequenced and reassembled). Library formed

What is Genetic engineering?

The extraction of genes from one organism/ manufacture of genes to place in another organism(. The receiving organism expresses the product.

How does gene sequencing allow comparisons between individuals and species?

Comparative gene mapping. Able to compare genes of same or similar protein by knowing each organisms base sequence and shows evolutionary relationships.

How are restriction enzymes used to extract sections of DNA containing a desired gene?

Cut through DNA at specific points. Creation of sticky ends or blunt ends

How are DNA fragments separated by size?

Electrophoresis. Restriction enzymes cut into fragments and sticky ends. Current passed through bath. DNA fragments move to +anode as negatively charged. Shorter=faster travel. Blue dye used to stain molecules.

How can fragments of DNA be identified?

DNA Probes. Short single strand DNA complementary to section of DNA being investigated. Radioactive or fluorescent marker. Copies of probe added to sample. Complementary base pairing/ annealing. Locate desired gene/ allele or comparisons of organisms

How does PCR make multiple copies of DNA fragments?

DNA sample, nucleotides and polymerase. Heated at 95~ for h2 bonds to break. Primers added and temp reduced for rebinding. DNA forms at either end of sample. Temp raised so polymerase binds o other DNA strand made. Process continues.

How can Genomes be sequenced?

Interrupted PCR. Primer anneals at 3;' end of template strand. Polymerase adds free nucleotides. Strand grows until modified nucleotide added and reaction stops. Many DNA molecules made with varying sizes. Colour and base sequence read by machine.

Into which vectors can fragments of DNA be incorporated?

Bacteria: Plasmid, Plant: Agrobacterium Tumefaciens, Animal: BAC

Why are microorganisms at an advantage if they are able to take up Plasmid DNA from the environment?

Forming recombinant plasmids. Genetic variation and antibiotic resistance

How can plasmids be taken up by bacterial cells?

Conjugation or introduction of a vector

How can genetic markers in plasmids be used to identify if the recombinant plasmid has been taken up?

Replica Plating- Growing bacteria on an agar plate, transferring to other growth plates (containing growth promoters/ inhibitors),.Analysis of growth patterns gives info of genetic properties of bacteria.

How is human insulin engineered (1)?

mRNA extracted from pancreas. Reverse transcriptase uses as template to make complementary single strand DNA. Doubled by DNA polymerase. Sequence of nucleotides added to each end: Sticky ends

How and why is Golden Rice genetically engineered?

Agrobacterium Tumefaciens take up daffodil genes. Bacterium Erwinia inserted into Ti plasmids. Gene introduced to rice embryo. Plants produce seeds with B carotene (yellow). To deal with Vit.A deficiency. Eyesight, growth and bones.

How is human insulin engineered (2)?

Plasmid cut with R.E, Single nucleotide added to each end: Sticky ends, Sticky ends of both make base pairs, Ligase links sugar phosphate backbones. Done in presence of calcium for porosity. Bacteria multiply: Clones. Transcribe and translate: insulin

What is Gene Therapy?

The use of Genetic technology to treat genetic disorders

What is Somatic Gene therapy?

Adding Genes [Polypeptides that are well functioning produced], or killing cells [cancerous cells engineered to have surface susceptible to immune system]. Functioning allele introduced to target cells. Short lived and effects restricted to patient

What is Germline Gene Therapy?

G.L cells: Each could potentially become a new being. Functioning allele introduced to these cells. Offspring may also contain allele. P

How can animals be genetically engineered for Xenotransplantation?

Genetically engineer cells of the animal to reduce immune cell activities involved in transplant rejection

What are ethical concerns of the use of genetic manipulation of organisms (humans, animals)?

Humans: >Treat disorders xEffect unpredictable, germline: no say, Designer kids. Animals>Pharmaceutoca; and production benefits xAnimal rights and religious beliefs.

What are ethical concerns of the use of genetic manipulation of organisms (plants and microorganisms)?

Plants: >Golden Rice, weedkillers xToxic to others, less genetic variation, resistance in weeds. Microorganisms: >Produce useful products eg insulin and growth xAntibiotic resistance, may mutate to be pathogenic