Using dna in science and technology

Technology

Using DNA in Science and Technology DNA Is the blueprint for life, It Is found In the nucleus of cells on the chromosomes. It Is found In many cell organelles, such as plasmids In bacteria, chloroplasts In plants, and mitochondria in both plants and animals. DNA helps us to perform many actions in solving crimes, and also helps us to do scientific studies that were not possible until recently. DNA has a double helix structure, its sugar phosphate backbone, made up of didgeridoos and a phosphate group are held together by hydrogen bonds and base pairs. These bases are adenine and guanine, thymine and cytosine.

There are coding and non coding parts of DNA, the non coding part Is called an Intro, this may not seem to have a function but It helps to keep the structure of the helix by cooling, regulates when genes are expressed and is also used in DNA replication. Non-coding regions of DNA between genes are the satellite DNA, this is a simple base sequence repeated many times. It's not all non-coding DNA though, the coding parts of the DNA are known as Exxon. Science and technology is used for genetic diversity, selective breeding Is used especially In farming for livestock.

Selective breeding means artificial selection means the controlled breeding of animals or plants by humans so only individuals with specific characteristics can reproduce. Farmers use this technique to get the best quality cattle and produce from the animals they have. To get the best animal possible, for example a milk cow, the farmer will select the best cows from the heard to breed from, these may be the ones with the largest udders or biggest milk yield, he will then breed from this animal, and the Fl offspring will be raised and used for milk. In the Fl generation he will do the same

again, selecting the best cows from the generation. E IF generation will have the most favorable characteristics and will have lost any of the unfavorable characteristics as they have been bread out of the stock. The farmer then has the most favorable genetic characteristics in his heard to breed from. However this has its downfalls, by choosing selective breeding you reduce the gene pool. Allele frequency is reduced and this leaves the heard vulnerable to contracting Infections and diseases, they have lost their ability to adapt and produce Immune reactions. When DNA of two species, one being radioactively labeled, are heated to separate the strands.

The mixture is cooled to allow the complementary bases to form hydrogen bonds. Some of the strands formed will be hybrids. These hybrids will be extracted then heated, the higher the heat needed to separate the strands the more hydrogen bonds between the strands, therefore the more closely related the species are. This process is known as DNA hibernation, It Is used to determine species and how closely related they are. This Is Important as It allows us to determine how closely related species are and thus if they will be able to breed and have viable offspring.

Genetic engineering is very important in allowing us to develop medical cures as well as for other uses, such as food production. Reverse transcript is the process of isolating a gene; the process will allow us to produce things such as insulin to help people suffering from diabetes. Retroviruses such as human immunodeficiency virus (HIVE) hold Information in the form of RNA, using an enzyme known as reverse protein is selected, for example the beta cells from the islets of Lanterns in the human pancreas.

These cells have large quantities of the relevant Mrs., this is therefore extracted. Reverse transcript is then used to make DNA from RNA. This DNA is known as complimentary DNA because it is made of the nucleotides that are complimentary to the Mrs.. To make another strand of DNA, the enzyme DNA polymerase is used to build up the complimentary nucleotides on the CDMA template. This double strand is the required gene, in this case human insulin. Scientists can produce this to make injections to give to sufferers of diabetes.

All organisms use defensive measures against invaders, bacteria are often invaded by viruses that inject their DNA into them and take over the sell. Some bacteria produce enzymes that cut up the viral DNA. One process produces blunt ends and other produces sticky ends. Each type of restriction underclass cuts a double DNA strand at a specific sequence of bases, known as the recognition sequence. When this occurs between two opposite base pairs it leaves blunt ends. The other method produces sticky ends; the staggered ends leave parts of the DNA unpaired and therefore available to form new bonds.

The restriction underclass identifies the recognition sequence and cuts the DNA, however instead of cutting in a straight line the cut is staggered leaving bases unpaired. The nucleotides on the end are implementation to the ones on the other side because they used to pair. If the same restriction underclass is used to cut DNA, then all the fragments produced will have ends that are complimentary, this means the single stranded end of a fragment can bond with the single stranded end of another fragment.

Once the sticky ends have paired up an enzyme known as DNA aliases is used to Join the two fragments together. A vector is a carrier DNA molecule into which the desired gene can be inserted. Usually, the vector is a plasmid. This is a small, circular piece of DNA often found in bacteria in addition to their functional DNA. The plasmids are modified so that they have two or more genes for resistance to antibiotics. They should also contain a sequence that can be recognized by the same restriction enzyme used to cut the fragments.

The site that is cut should be in one of the genes for antibiotic resistance. Cut the genome with restriction underclass and mix with the plasmid that has also been cut with the same enzyme so that the sticky ends of the fragments and the plasmid are complementary. Hopefully, some fragments will insert into the plasmid DNA before either segment Joins with itself. The fragments are added to the plasmids with different outcomes. One is the plasmid rejoins, or the fragment Joins with plasmid but the fragment does not contain the desired gene.

Alternatively the fragment Joins with plasmid, however this time the fragment does contain the desired gene or finally it is unsuccessful and the fragment Joins with itself. Some plasmids will now contain the recombinant DNA fragment, other plasmids; however will not contain a fragment. If the plasmids are recombinant then one of the antibiotic resistance genes will have been disrupted. However, the other gene for antibiotic resistance will still be intact. Add this mixture of recombinant and non- combatant plasmids to bacteria. Some will take up the plasmids if they are in calcium chloride solution.

The bacteria are transferred to a plate containing the antibiotic inclining. Those bacteria that have taken up any plasmid will be resistant recombinant and non-recombinant plasmids. These colonies are then replicated onto plates containing the antibiotic tetracycline. Those bacteria with recombinant plasmids will not survive because the fragment has disrupted the gene for resistance.