Gene Cloning Genetical Engineering Services Section Front Page

?Genetic engineering is the process of manually adding new DNA to an organism. The goal is to add one or more new traits that are not already found in that organism. Examples of genetically engineered (transgenic) organisms currently on the market include plants with resistance to some insects, plants that can tolerate herbicides, and crops with modified oil content.Gene cloning is the process in which a gene of interest is located and copied (cloned) out of DNA extracted from an organism. When DNA is extracted from an organism, all of its genes are extracted at one time. This DNA, which contains thousands of different genes. The genetic engineer must find the one specific gene that encodes the specific protein of interest. Applications; Gene targeting is a different technique that uses homologous recombination to change an endogenous gene, and can be used to delete a gene, remove exons, add a gene, or introduce point mutations. Genetic engineering has applications in medicine, research, industry and agriculture and can be used on a wide range of plants, animals and microorganism Genetic engineering has produced a variety of drugs and hormones for medical use. For example, one of its earliest uses in pharmaceuticals was gene splicing to manufacture large amounts of insulin, made using cells of E. coli bacteria. Interferon, which is used to eliminate certain viruses and kill cancer cells, also is a product of genetic engineering, as are tissue plasminogen activator and urokinase, which are used to dissolve blood clots. The evolving field of gene therapy involves manipulating human genes to treat or cure genetic diseases and disorders. Modified plasmids or viruses often are the messengers to deliver genetic material to the body's cells, resulting in the production of substances that should correct the illness. Sometimes cells are genetically altered inside the body; other times scientists modify them in the laboratory and return them to the patient's body. Gene cloning is the method of producing identical genes through different procedures. Method of gene cloning provides opportunity to the scientists to study the structure and function of genes in detail. For this purpose, gene of interest is inserted into the bacterial cell which acts as a host. The cloned gene can be used for many research purposes like detection of diseases, gene therapy and other medical applications. There are following steps needed to make the cloned genes. -Isolation of the Desired Gene. -Introduction of the Desired Gene into the Plasmid. -Isolation of the Cloned gene. Gene cloning is applicable in many fields of science such as medicine and agriculture. -In medicine, bacteria play a vital role for the synthesis or production of many vitamins, hormones and antibiotics. It is done by introducing the desired gene into the plasmid and then this plasmid replicates to make multiple copies of this gene. If scientists have to treat some dangerous disease, they clone the healthy gene and then insert it into the organism to replace it with the diseased gene -Agricultural Applications:- Bacteria also are important for the nitrogen fixation. Bacteria along with the desired gene are used to increase the crop productivity and health. They make the farmers free of using expensive fertilizers which can damage the crops. Challenges: Biomedical applications of genetically engineered animals are numerous, and include understanding of gene function, modeling of human disease to either understand disease mechanisms or to aid drug development, and xenotransplantation.Perhaps the most controversial use of genetically engineered animals in science is to develop the basic research on xenotrans-plantation — that is, the transplant of cells, tissues, or whole organs from animal donors into human recipients. In relation to organ transplants, scientists have developed a genetically engineered pig with the aim of reducing rejection of pig organs by human recipients (15). This particular application of genetic engineering is currently at the basic research stage, but it shows great promise in alleviating the long waiting lists for organ transplants, as the number of people needing transplants currently far outweighs the number of donated organs. Ethical issues, including concerns for animal welfare, can arise at all stages in the generation and life span of an individual genetically engineered animal. The following sections detail some of the issues that have arisen during the peer-driven guidelines development process and associated impact analysis consultations carried out by the CCAC. The CCAC works to an accepted ethic of animal use in science, which includes the principles of the Three Rs (Reduction of animal numbers, Refinement of practices and husbandry to minimize pain and distress, and Replacement of animals with non-animal alternatives wherever possible) (17). Together the Three Rs aim to minimize any pain and distress experienced by the animals used, and as such, they are considered the principles of humane experimental technique. However, despite the steps taken to minimize pain and distress, there is evidence of public concerns that go beyond the Three Rs and animal welfare regarding the creation and use of genetically engineered animals. Abiotic stress conditions such as drought, heat, or salinity cause extensive losses to agricultural production worldwide. Progress in generating transgenic crops with enhanced tolerance to abiotic stresses has nevertheless been slow. The complex field environment with its heterogenic conditions, abiotic stress combinations, and global climatic changes are but a few of the challenges facing modern agriculture. A combination of approaches will likely be needed to significantly improve the abiotic stress tolerance of crops in the field. These will include mechanistic understanding and subsequent utilization of stress response and stress acclimation networks, with careful attention to field growth conditions, extensive testing in the laboratory, greenhouse, and the field; the use of innovative approaches that take into consideration the genetic background and physiology of different crops. Cloning animals through somatic cell nuclear transfer is simply inefficient. The success rate ranges from 0.1 percent to 3 percent, which means that for every 1000 tries, only one to 30 clones are made: -The enucleated egg and the transferred nucleus may not be compatible -An egg with a newly transferred nucleus may not begin to divide or develop properly -Implantation of the embryo into the surrogate mother might fail -The pregnancy itself might fail Problems during later development -Abnormal gene expression patterns -Telomeric differences