

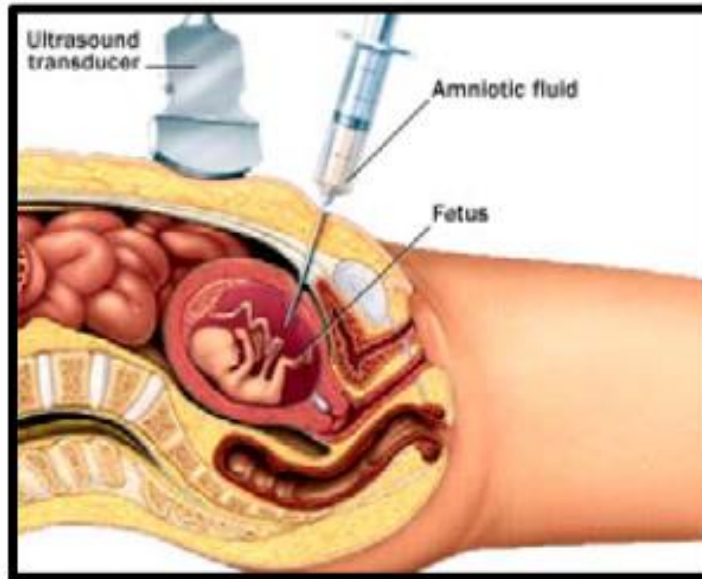
Section 4.3 – Reproductive Technologies

SBI3U

MRS. FRANKLIN

Prenatal Testing

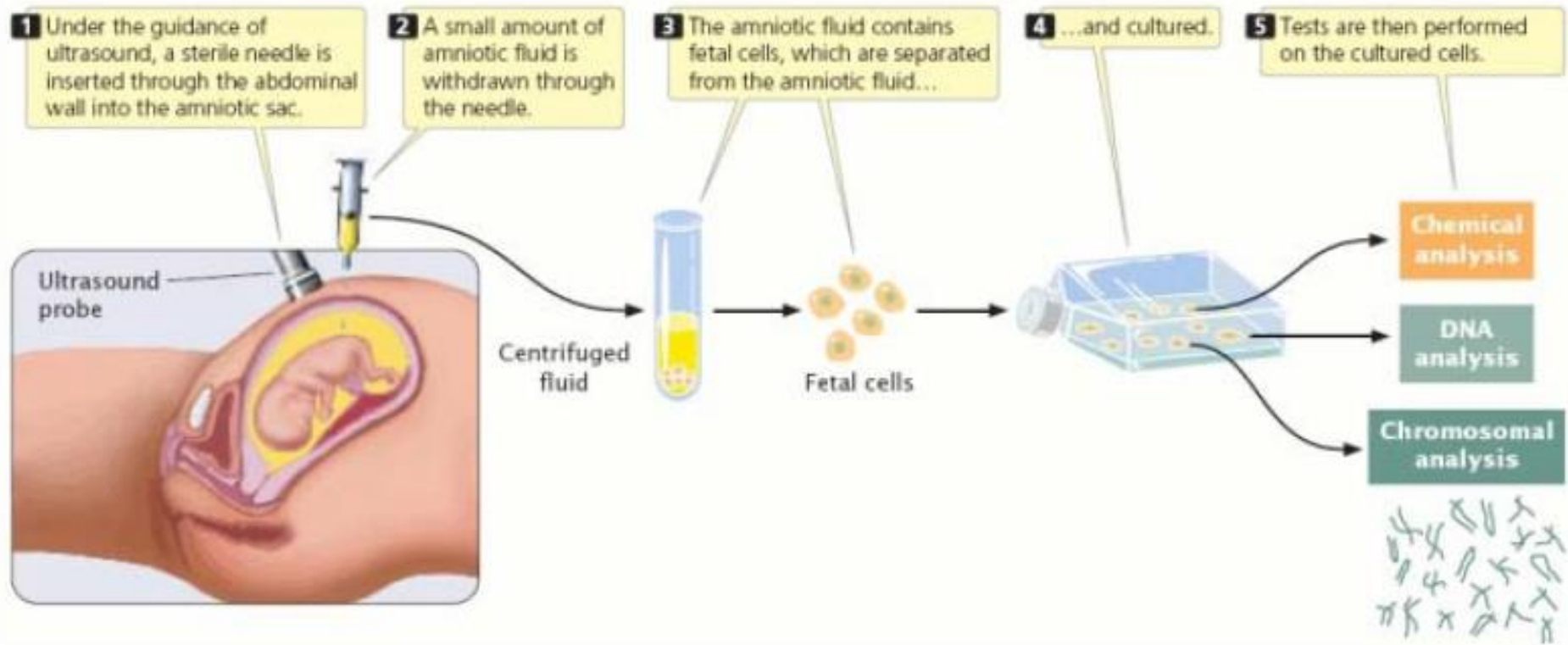
Prenatal testing is a test performed on a fetus that looks for genetic abnormalities.



Depending on the results, more invasive tests may be performed, such as collecting the fetus' DNA.

The expecting mother has an ultrasound and blood work. Fetal proteins, image of the fetus and fluid at the back of the fetus' neck are analyzed.

Prenatal Testing



Reproductive Technologies- Plants/Animals

Reproductive technologies have been used for many years to obtain desirable traits in livestock and plant crops.

Two technologies to obtain desirable traits:

- 1) Selective Breeding
- 2) Artificial Insemination

Reproductive Technologies- Plants/Animals

- 1) Selective breeding: process of breeding plants and animals for desirable traits. Many new breeds of animals and plants have been developed due to selective breeding.



Within agriculture there are three methods that people use in order to select these traits.

Reproductive Technologies- Plants/Animals

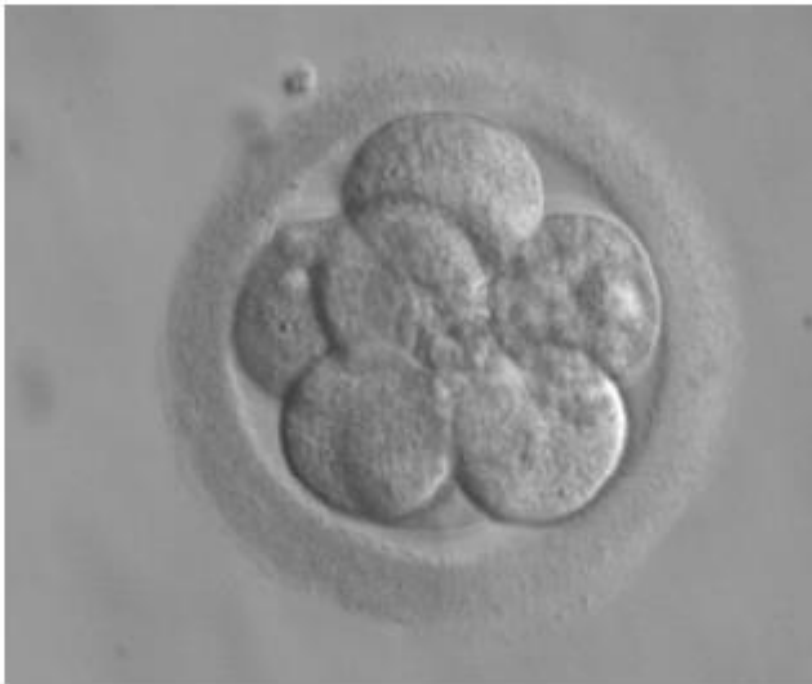
2) Artificial Insemination: the sperm is collected and concentrated and later introduced into the female's reproductive system. The semen from high-quality males is stored.



This is a very common method used by farmers to select desirable traits and produce a desired animal.

Reproductive Technologies- Plants/Animals

3) Embryo Transfer: an egg is fertilized in a culture and transferred to a female recipient.



This procedure is similar to In vitro Fertilization used in humans.

Reproductive Technologies- Humans

There are numerous technologies available for married couples who are not able to conceive.

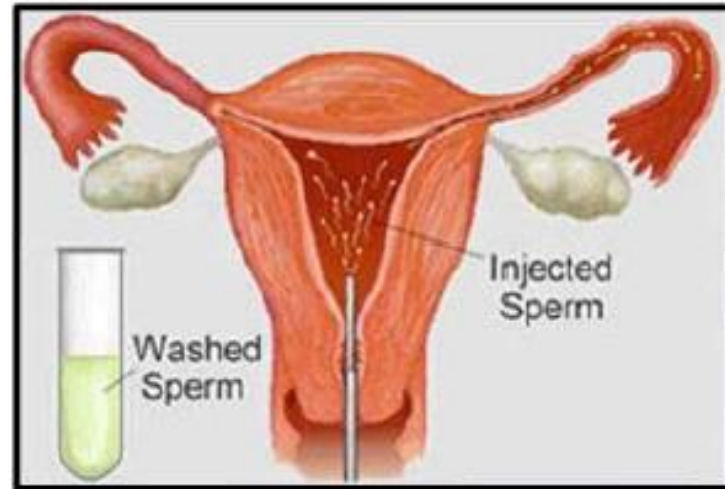
All of these technologies are referred to as « *Assisted Reproductive Technologies* » (ART).

The following technologies are used in humans:

- 1) Artificial Insemination
- 2) In vitro fertilization

Reproductive Technologies- Humans

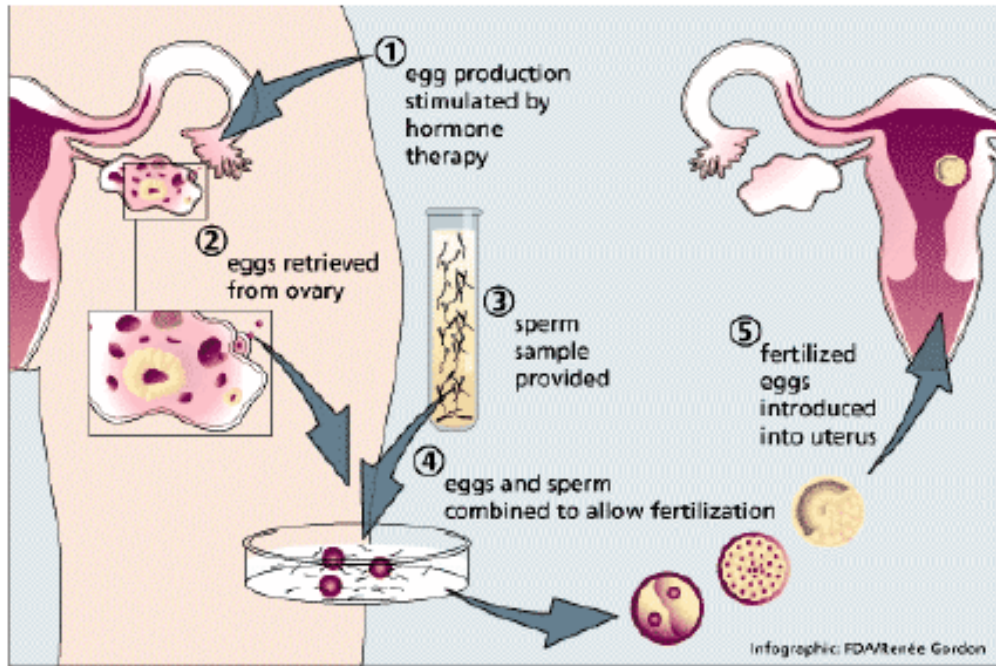
1) Artificial Insemination: The semen is stored and later transferred to a female's reproductive tract.



The donor sperm can either be the woman's partner or from an unknown source.

Reproductive Technologies- Humans

2) In Vitro Fertilization (IVF): Generally used for women with blocked fallopian tube. Immature eggs are retrieved and combine with sperm in the laboratory.



Once the egg is fertilized, the zygote is placed into the women's uterus.

Nowadays, over 1.5 million babies are conceived through IVF.

Reproductive Technologies- Humans

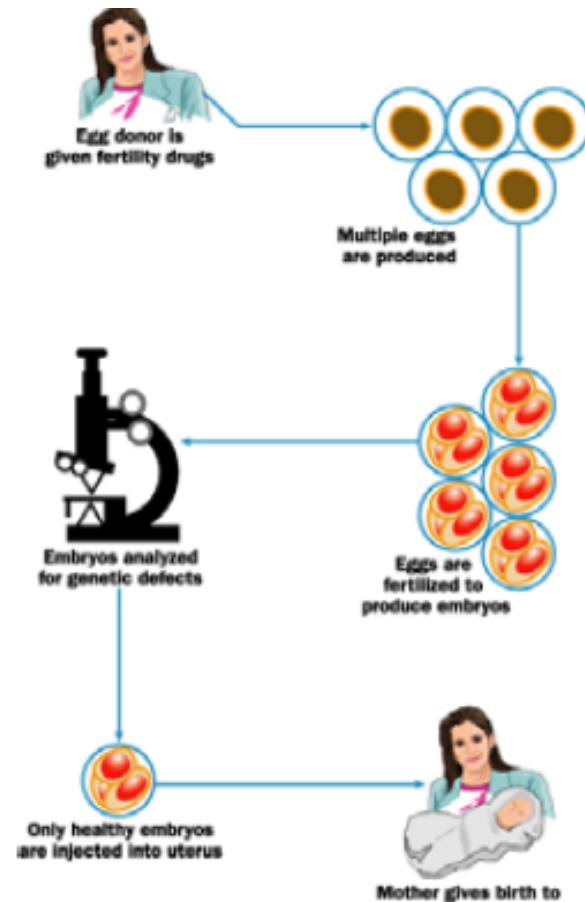
Preimplantation Genetic Diagnosis:

A genetic test that allows diagnosis of genetic disorders.

This occurs before the zygote of IVF is transferred into the female.

Once the zygote divides, one of the cells is analyzed.

Only the healthy embryos are implanted into the uterus.



Reproductive Technologies- Cloning

Process that reproduces identical copies of genes, cells or organisms.

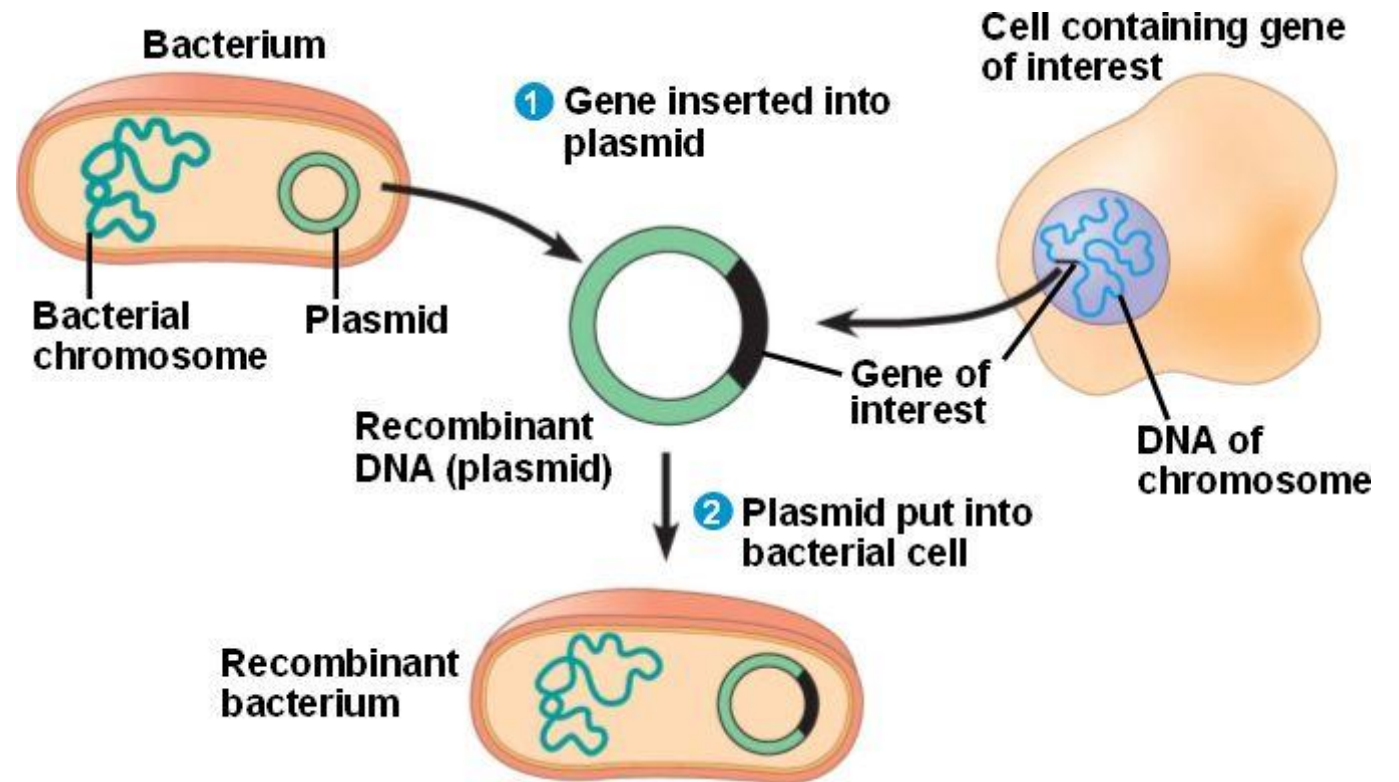
There are 3 main types:

- a) Gene Cloning
- b) Therapeutic Cloning
- c) Reproductive Cloning

1) Gene Cloning

Step 1: The desired DNA fragment is combined with a vector to create a 'Recombinant DNA Molecule'

Step 2: The recombinant DNA is placed back into a bacterial cell and multiple copies of the desired gene are made.

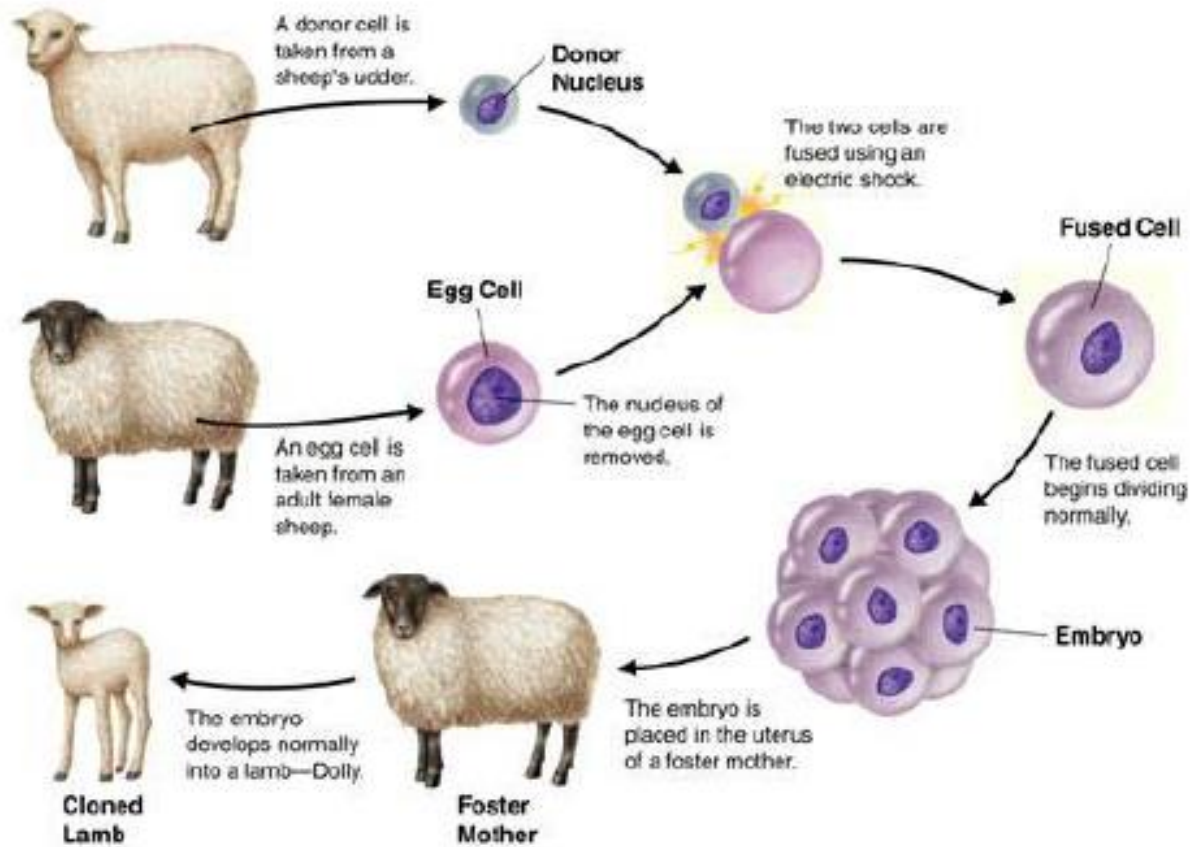


2) Therapeutic Cloning

Process of producing genetically identical cells which can treat various diseases. The cloned cell is used to grow new tissues and/or organs.



3) Reproductive Cloning

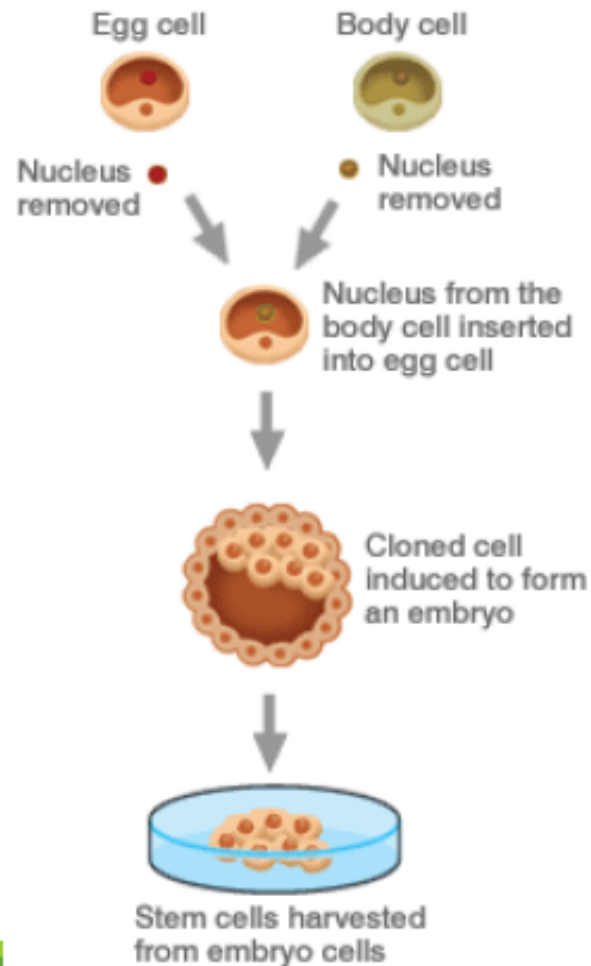


It is a process that produces genetically identical organisms. From those that are born only a small percentage of them survive.

Somatic Cell Nuclear Transfer (SCNT)

The nucleus of an unfertilized egg is removed and replaced with a nucleus of a somatic cell.

The DNA of the somatic cell is able to direct the development of the recipient egg to form proper tissues and organs.



Reproductive Technologies – Transgenic Organisms

Organisms whose genetic material contains DNA from various species. They are also known as Genetically modified organisms (GMOs).

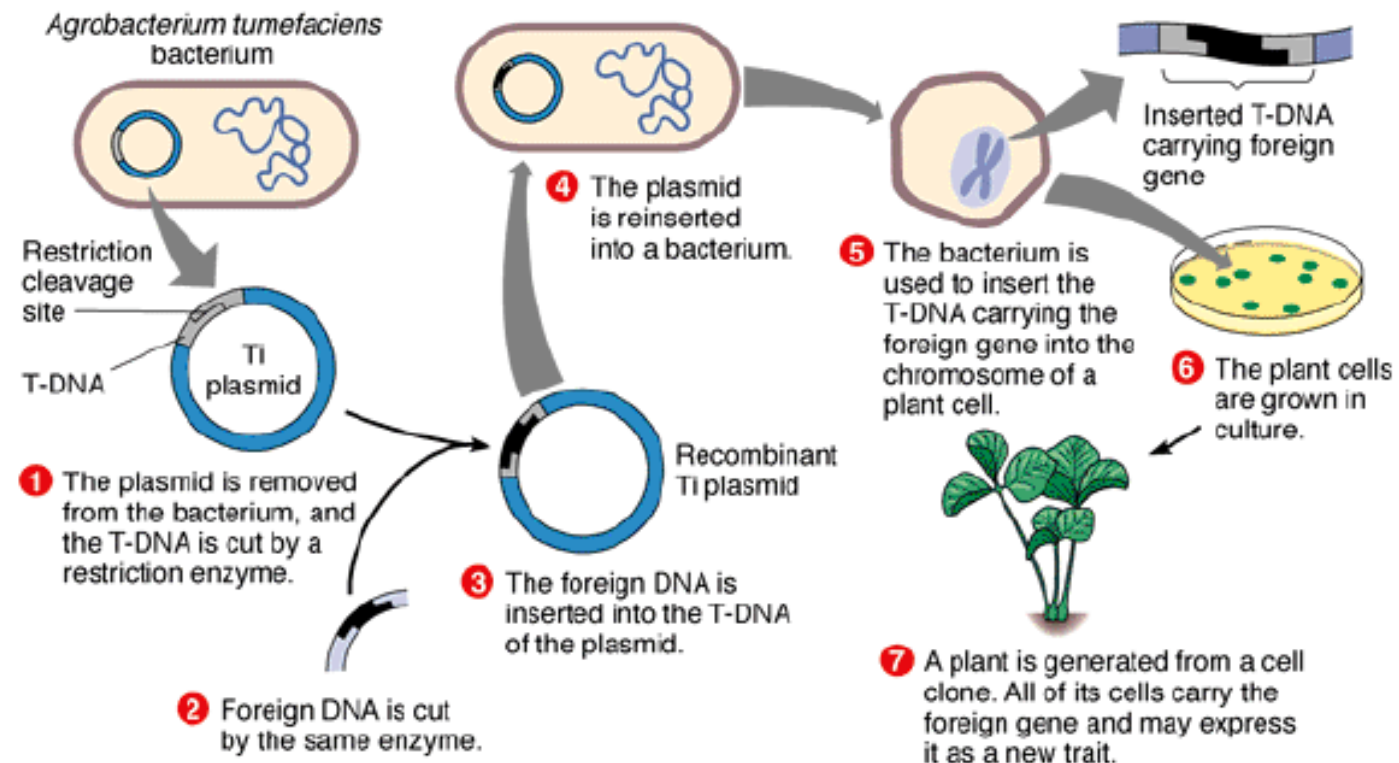


Plants are continuously modified to increase resistance to herbicides, insects, pests or viruses. Scientists also use GMOs to increase nutritional value of plants.

Foreign DNA must be inserted into the organism in order for this to take place.

Reproductive Technologies – Transgenic Organisms

Transgenic plants can also be used for medical purposes. Insulin is now grown in safflower plants to produce a less expensive version of insulin for people with diabetes.



Applications of Transgenic Organisms

A) Used to study diseases and medical procedures.

B) Used to produce medical proteins products. (*e.g. goats- produce milk with Human growth hormone*)

C) Organisms can be be developped to serve as organ donors to humans.

Ethical Concerns with Transgenic Organisms

- 1) *Environmental Threat*: herbicide-resistant plants could encourage the use of stronger herbicides.
- 2) *Health effects*: consuming these products could cause health concerns
- 3) *Social and Economic*: the monney spent is greater than the overall benefit.

Checking for Understanding

1. Which of the following best describes the role of a plasmid in gene cloning?

- A) It contains only the gene to be cloned
- B) It is the vector which acts as a carrier of the gene to be cloned.
- C) It is used to disrupt the chromosomes to extract the gene to be cloned.
- D) It is used to break open the bacterial host cells.
- E) IT is a cell that is fertilized before implantation in a uterus.

Homework

Textbook: p. 190 # 2, 4,5, 8, 9, 10, 13 & 15