GENETICALLY MODIFIED ORGANISMS

What are GM's?

- Organism one that has been altered through recombinant DNA technology
- Involves either the combining of DNA from different genomes or the insertion of foreign DNA into a genome
- The most common genetically modified (GM) organisms are crop plants
- Microbes are the first organisms to be genetically modified

What is not a GMO?

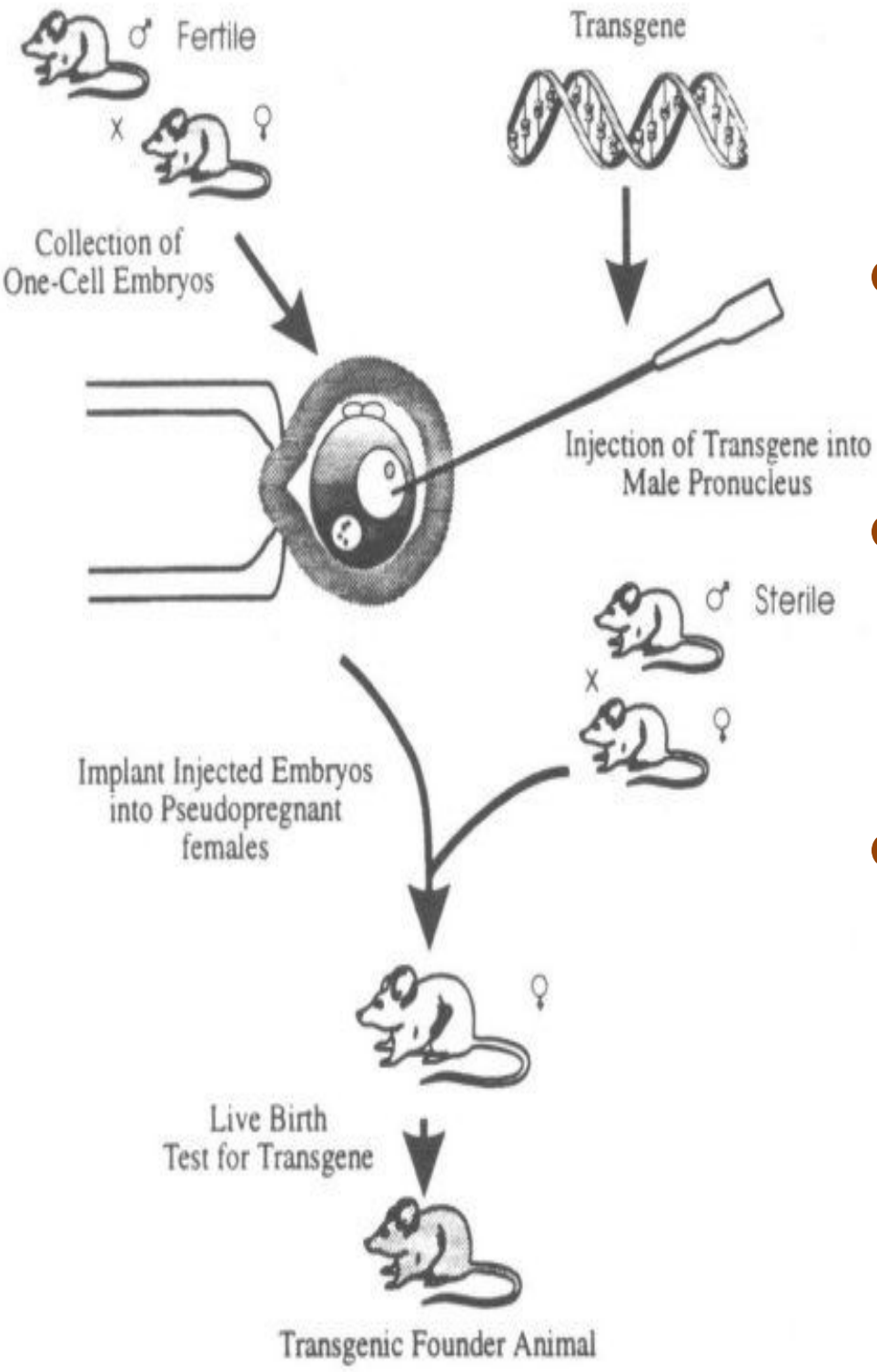
- Does not include
  - Mutants.
  - Fusion of animal cells unless the product can form an animal.
  - Organisms formed by natural DNA transfer.

How transgenic organisms work…

Three Main Methods…

- DNA Microinjection
  - A foreign gene is directly injected into a fertilized egg that is put into a female animal that acts as a surrogate mother for the egg.
- Retrovirus-Mediated Gene Transfer
  - A retrovirus is a virus that attaches to an organism's DNA and changes it to include a new characteristic. Scientists expose ordinary cells to a retrovirus when they are trying to create transgenic animals.
- Embryonic Stem Cell-Mediated Gene Transfer
  - Stem cells are blank cells that can turn into any type of cell. Scientists modify these cells, and then add them to an embryo, which is a fertilized egg that develops and grows until it hatches or is born.

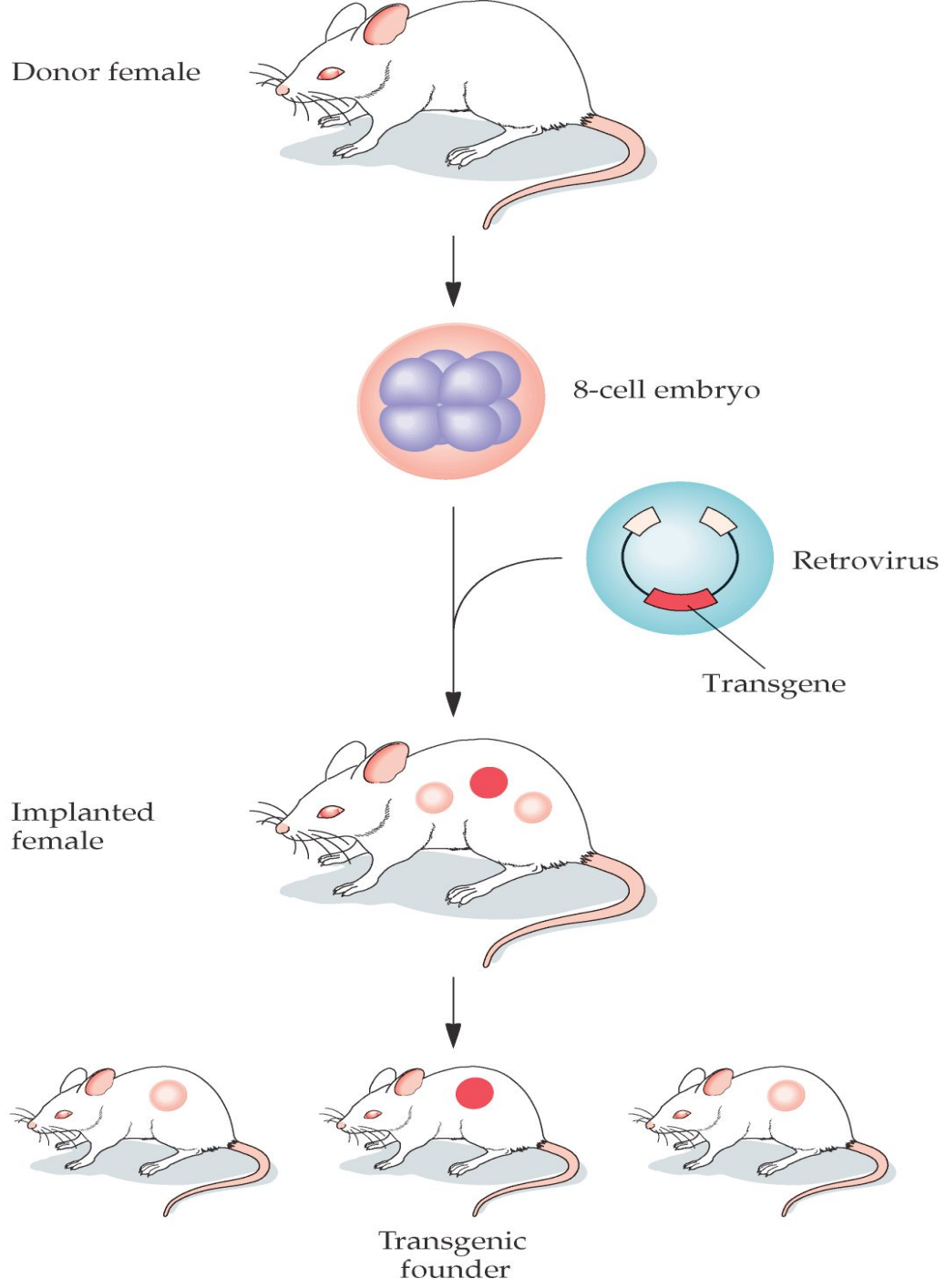
DNA MICROINJECTION



- Most commonly used method
- Need to check mouse for DNA , RNA and protein (by some specific assay method)
- Expression will vary in transgenic offspring: due to position effect and copy number

RETROVIRUS-MEDIATED GENE TRANSFER

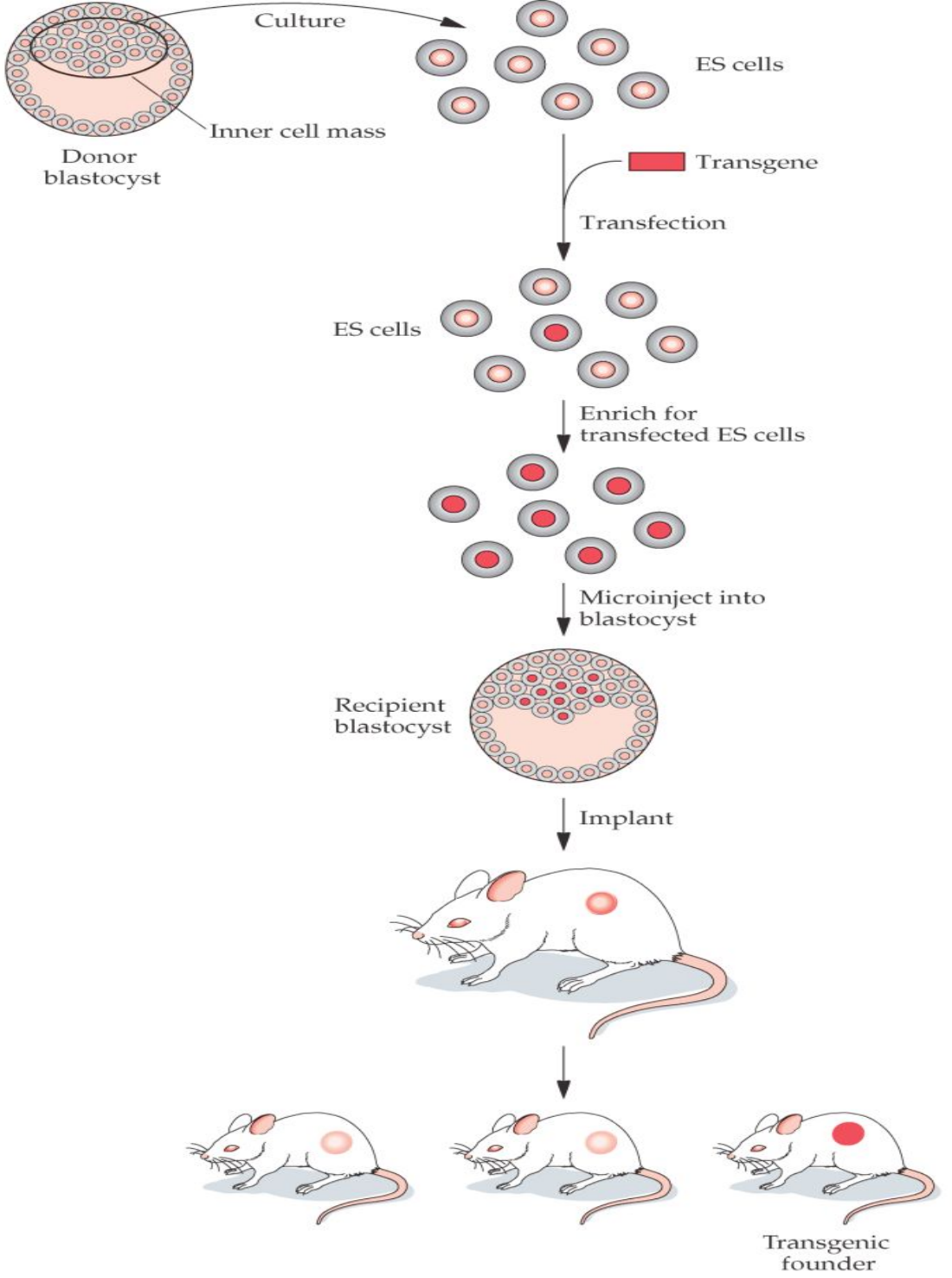
Retroviral vectors can be used to create transgenic animals



EMBRYONIC STEM CELL-MEDIATED GENE TRANSFER

- Genetically engineered embryonic stem (ES) cells can be used to create transgenic animals

- This method allow for gene targeting via homologous recombination.



THE MOST COMMON TYPES OF GMO'S

I. FOODS

- Crops are modified to develop resistance to herbicides and increase their nutrient content, for example corn and soybeans .

- Fruits are modified to make them ripen later. This help them available fresh in marketplace during a longer time or for fruits that ripen after being picked, make it easier to transport them.

THE MOST COMMON TYPES OF GMO'S

II. MEDICINES

- These can be produced cheaper and easier some are: insulin, thyroid hormones and the Hepatitis B vaccine
- GM Bacteria's have been particularly important in producing large amounts of pure human proteins for use in medicine like clotting factors for hemophilia and human growth hormones to treat dwarfism

OTHER TYPES OF GMO'S ARE

III. MAMMALS

- Research human diseases
  (To develop animal models for many diseases.)
- Produce industrial or consumer products
  (pharmaceutical products or tissue implantation)
- Enhance production or food quality traits
  (faster growth fish, pigs that digest food more efficiently)
- Improve animal health(disease resistance)

GENETICALLY MODIFIED PIGS

- MEDICINE
  - Production of pharmaceuticals (human hemoglobin in blood of pigs for treating Trauma patients)
  - Organs for Xenotransplantation into humans
  - development of models for human diseases

Applications

- To research human diseases (for example, to develop animal models for these diseases)
- To produce industrial or consumer products
- To produce products intended for human therapeutic use (pharmaceutical products or tissue)
- To enhance production or food quality traits (faster growing fish, pigs that digest food more efficiently)
- To improve animal health (disease resistance)


THANK YOU