

Transgenic mice

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Introduction

Transgenic is a word which is used to indicate an organism which has its genome altered. It is a synonym of genetically modified or recombinant organisms. These are generally created for human benefits. Transgenic animals are just one in a series of developments in the area of biotechnology. Biotechnology has transformed the way in which we understand processes such as engineering and manufacturing. These terms now include the use of living organisms or their parts to make or modify products, to change the characteristics of plants or animals, or to develop micro-organisms for specific uses. Genetic manipulations at the level of DNA have also changed long held views as to what is considered to be animal, plant and human.

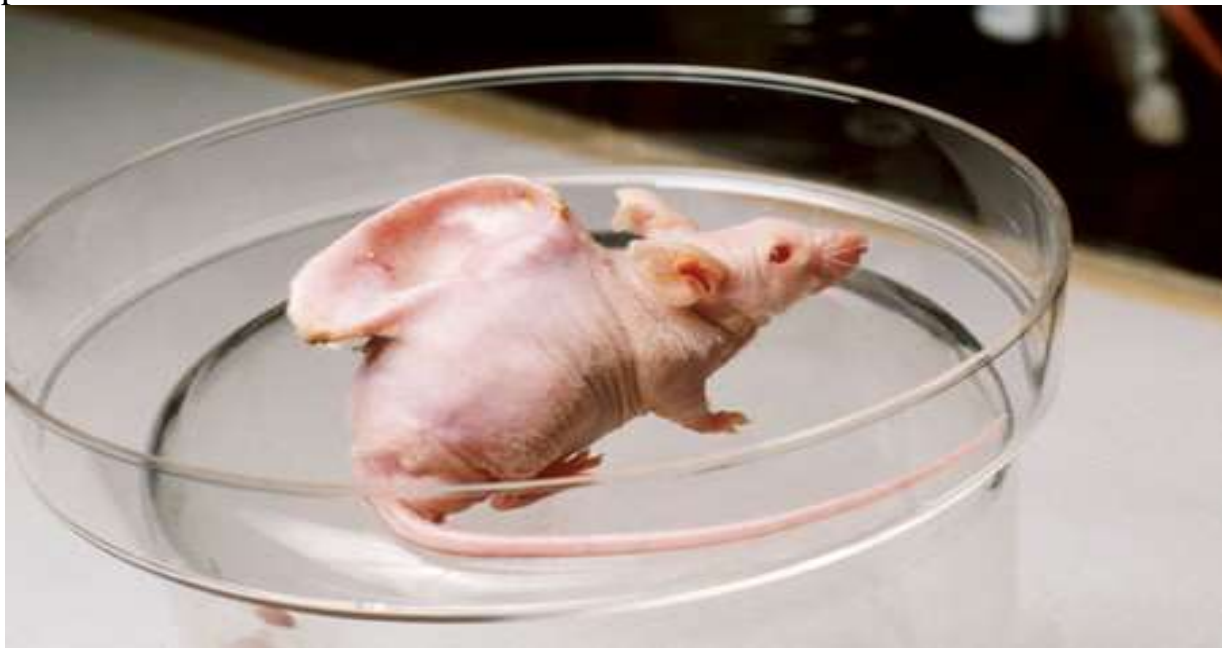


Fig1: Transgenic animal: Human ear on mouse

First transgenic animal was a 'supermouse' developed by Ralph Brinster (university of Pennsylvania) and Richard Palmiter (University of Washington) in 1982. It was created by inserting human growth hormone gene in mouse genome and the resultant transgenic mouse was much larger than the parent.

Production of Transgenic mice

The transgenic animals are created by inserting a foreign DNA into the genome of host organism (here in case of mice).

There are four steps which include:

Step 1: Construction of Transgene- for Transgene construction 3 parts are needed

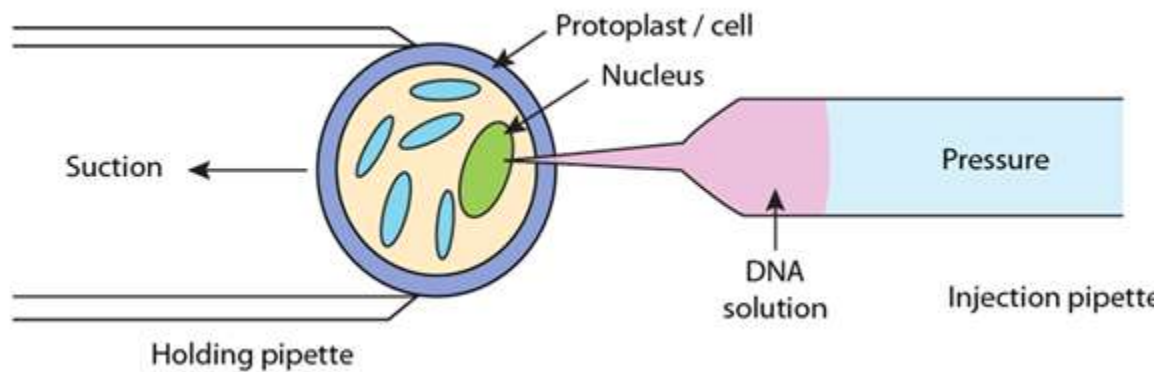
- Marker Sequence
- Promoter sequence
- Gene of interest
- Termination sequence.

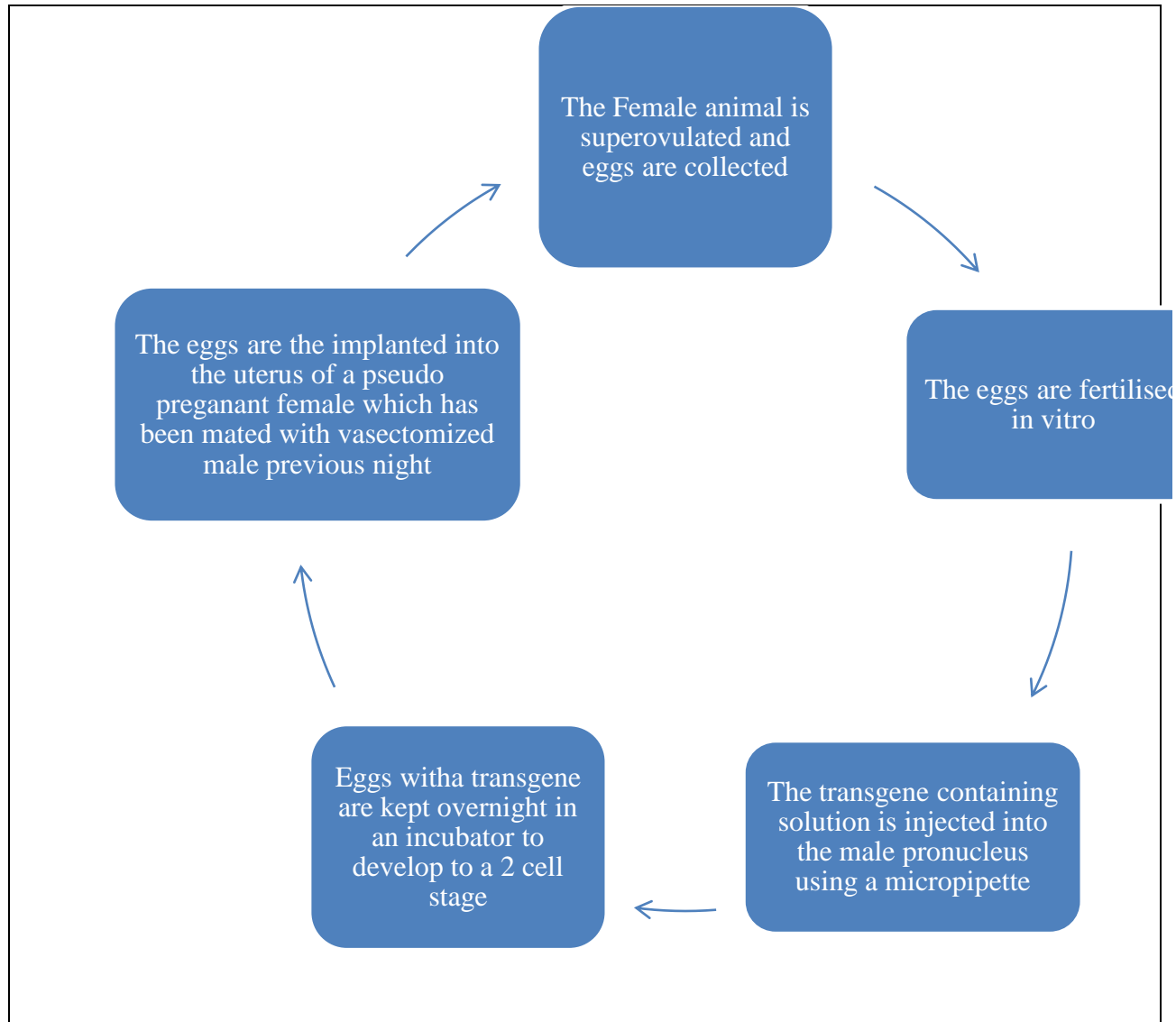


Step 2: Introduction of foreign gene into the host-

There are various methods for the insertion of Transgene into the host organism genome

1. Microinjection Method:

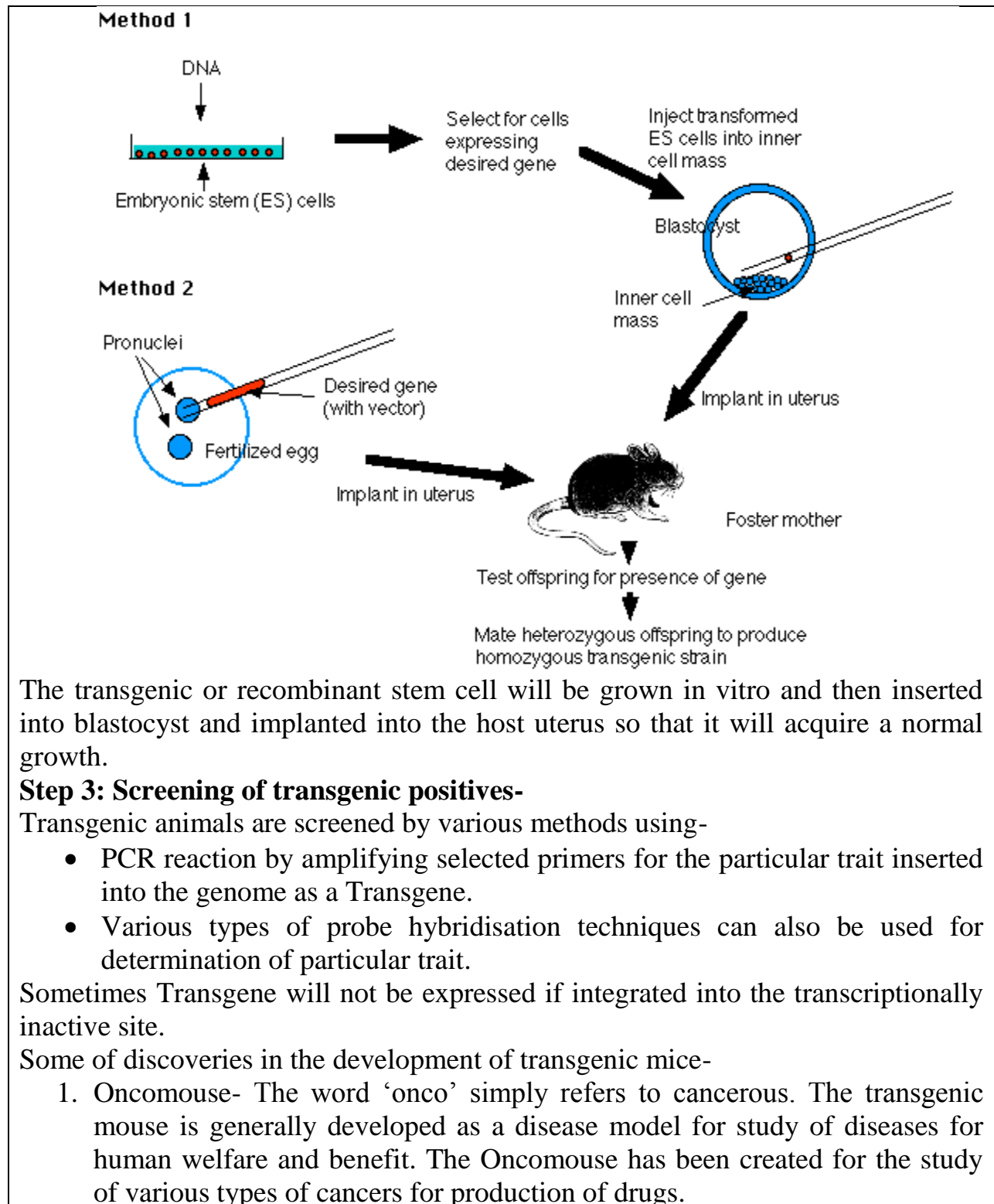




1. Embryonic Stem Cell:

The transgenic animals are created by manipulating embryonic stem cell which is obtained from inner cell mass of blastocyst.

The Transgene is then incorporated into the cells by using microinjection, electroporation or by retrovirus mediated gene transfer method.





2. Supermouse- This is the first mouse created by using human growth hormone gene as a foreign DNA inserted into the host mice.

The image is an comparison between a transgenic mouse and a normal mouse. The giant mouse developed from a fertilized egg transformed with a recombinant DNA molecule containing the **Human growth Hormone**.



3. Doogie mouse- It is a type of transgenic mouse with improved level of hearing and learning capacity. These mice have enhanced function at NMDA (N-methyl-D-aspartate receptor, ion channel protein found in nerve cell) receptors, which are needed for the brain to store new information.[1]



4. Knock-out mice: These are transgenic animals which are created by inactivating a particular gene coding for a particular trait. These are generally made for the detection of function of particular gene.



Figure- A laboratory mouse, in which a gene affecting hair growth has been knocked out (left), is shown next to normal lab mouse.

5. Knock-in mouse- A 'Knock-in' defines a biological model in which a gene sequence is inserted at a particular locus. This technology is often used for the creation of disease models [2].

References (if any)

Reference

1. <http://www.animalresearch.info/en/designing-research/research-animals/mouse-gm/>
2. <http://www.genoway.com/services/es-cell/knockin-mouse/ki.htm>

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