Transgenic Organisms

•A transgenic organism is one into which a gene from some other species has been transferred.

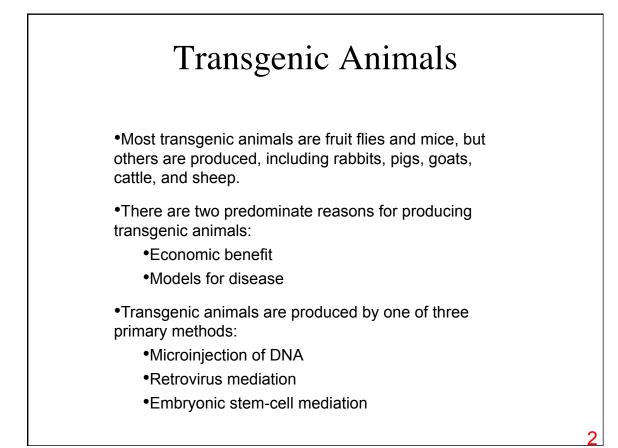
•Transgenic organisms are examples of genetically modified organisms (GMO's).

•The transferred gene is called a transgene.

•A transgene, like any other gene, indirectly codes for a protein, which corresponds to a particular trait.

•Because of the universality of the genetic code, a transgene will allow the transgenic organism to produce the same protein (and therefore exhibit the same trait) as the original, "donor" organism.

•Transgenes are introduced into the recipient organism's germ line.



Microinjection of DNA

•DNA containing the transgene is injected into the pronucleus of a gamete.

•The transgenic gamete is used for in vitro fertilization.

•The resulting embryo is implanted into a female.

•Transgenic animals are then mated to increase the chance of offspring containing the transgene.

•Microinjection has a fairly low success rate.

Retrovirus-mediated Gene Transfer

•A retrovirus genome is RNA rather than DNA.

•The code in the viral RNA is "reverse transcribed" to produce DNA, which is then incorporated into the host cell.

•For use in transgenesis, viral RNA is modified and the viri are introduced into an animal.

•The invading viri cause the animal cells to produce and incorporate DNA corresponding to the viral RNA.

•Transgenic animals produced using retrovirus-mediated gene transfer are chimeras.

Embryonic Stem-cell-mediated Gene Transfer

- •Embryonic stem cells are totipotent.
- •The DNA of certain stem cells is modified.
- •The DNA of the modified stem cells is passed on to the embryonic cells that develop from those stem cells.
- •Transgenic animals produced using embryonic stemcell-mediated gene transfer are chimeras.
- •This method has the advantage of allowing detection of transgenesis at the embryonic level.