

Transgenic animals a breakthrough in biotechnology

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Genetic manipulation in animals has been proved over a decade as a fruitful futuristic technology in improving their production potential. Gene transfer is one such avenue with unparalleled prospects in livestock industry.

A transgenic animal is the one which harbours a foreign gene sequence in all or at least few of its cells which they can transmit to their progenies. When a foreign gene is introduced in to a fertilized egg before the egg has divided, the incorporated gene will be inherited by all the cells of the embryo including the germ cells. Hence the functions of the incorporated gene will regulate the performance of the resultant transgenic animal and its progenies.

In this technique, fertilized eggs prior to its division are collected from donor animals after super ovulation and insemination. The eggs selected for gene transfer should contain both the male and female pronuclei. Then a solution containing 200 to 2000 copies of DNA in few picolitres will be injected to one of the two pronuclei. The micro injected eggs are then transferred to the uterus of surrogate dams in appropriate phase of oestrous cycle where it develops to term.

Zygotes collected after in vitro fertilization of in vitro matured oocytes is an inexpensive abundant source of it. More over such zygotes have the marked advantage over the in vivo derived ones that the stage of cell cycle is easily predictable in them. Other than the micro injection method, gene transfer can also be performed with the use of embryonic stem cells or retro-viral vectors.

Mice was the first animal to undergo such manipulations successfully in 1981. Transgenic mice was produced by injecting fertilized eggs with DNA containing gene for rat growth hormone. The resultant mice and half of its progenies had grown nearly twice larger as its control and with a growth hormone concentration as much as 800 times higher. Thereafter, with suitable modifications in methodology, transgenic rabbits, pigs, sheep and cattle have been produced successfully.


Potential applications of gene transfer

Large amount of specific proteins which are vitally needed for synthesising pharmaceuticals can be produced from transgenic animals by incorporating the corresponding genes for the specific proteins, several of such proteins include blood clotting factor, tissue plasminogen activator and human serum albumin.

Gene manipulation can be effectively utilised for generating animals with

desired genotype such as disease resistant animals by incorporating the gene regulating the particular disease. Body composition, growth rate, milk composition etc can be altered for the betterment of livestock industry. Lactose-deficient milk synthesised in a similar way can be given to people who are intoler-

ant to lactose.

Applied studies in domestic animals are still at an early stage due to its time-consuming, expensive and sophisticated procedures. But further research in this area will certainly bring out the multifaceted potentials of this emerging branch of biotechnology. 

Progress

JAYANTA MAHAPATRA

1. TODAY

Our bags are packed.
But where is it that we are going?

Is poetry only a disguise
at being accused off showing
the silence of starlight in dying rain-pools?
Are we going to die the way we did
before?

From another
newly-built high-rise in the city
a sob escapes into the night.
What do the beheaded roots of trees
covet?
The sky's veins with their sighs,
or the air, where man's terror only reigns?

I want to forget what I see.
Fallen trees line themselves up in the rear-
view glass.
Men have forgotten their sleep, crossing
borders,
searching for man's perfect face, his
elusive peace.
But peace is a woman who'd rather hang
from a rope
than let the best of progress lie on her.

It's the same mountain
man will climb, that haunted mountain
which had taught him once the secret of bird and star.
And he holds his hands to the sky
not knowing he has those secrets already.

2. TOMORROW

A lone sunbird flashes light and gold.
It had wings of wax, dreams of wind.
And each night it thought it heard
sobs of pine cones and raindrops rising from the
ground,
sitting on the tortured bonsai left behind.

