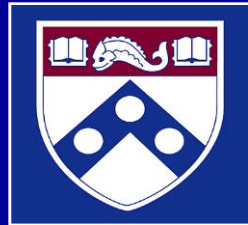


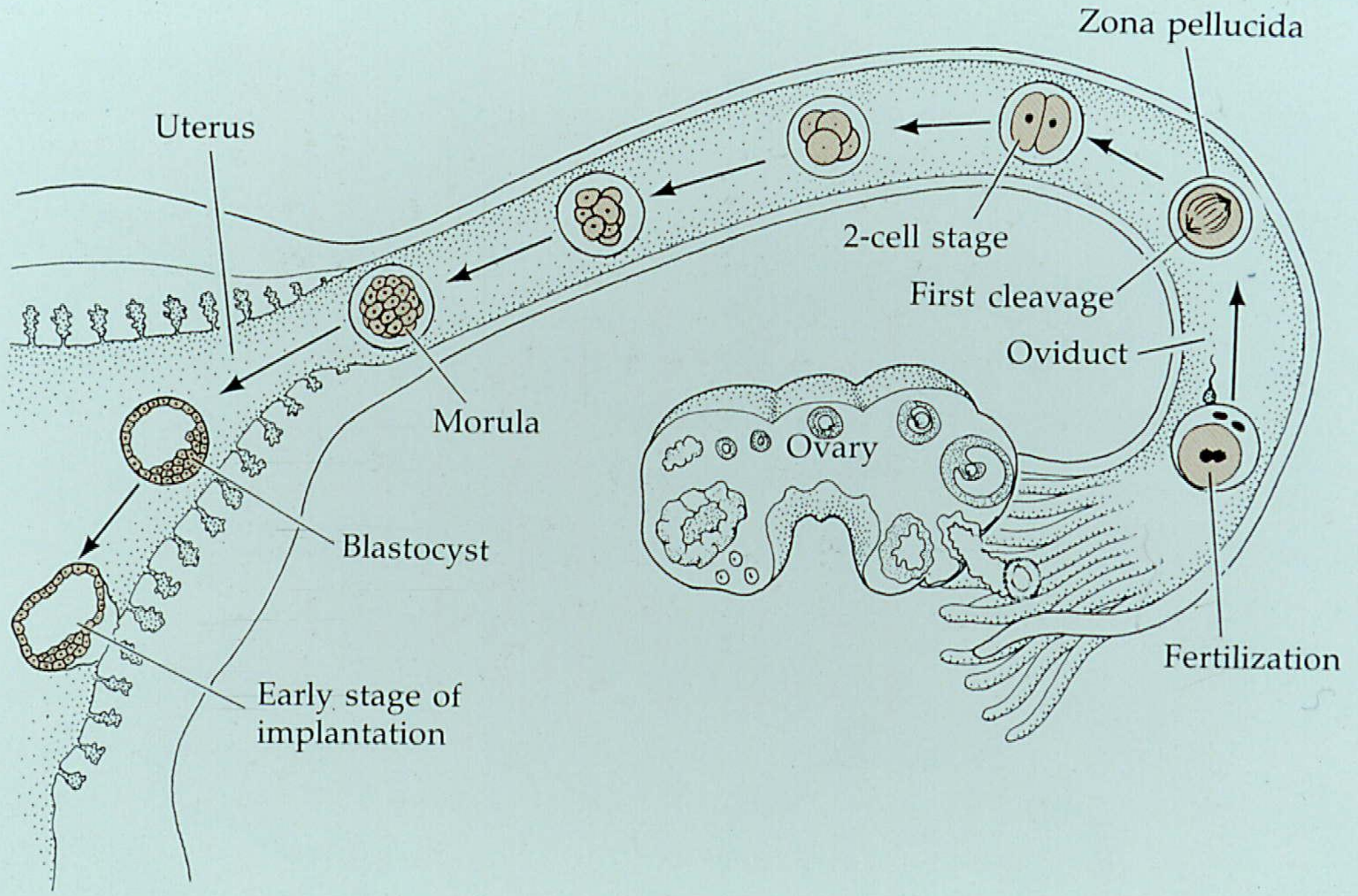
The Mammalian Germline and The Program of Life

Department of Animal Biology
School of Veterinary Medicine
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Philadelphia, Pennsylvania



Germline Modification by Man in the Evolution of Modern Human History

- Domestication of animals and plants
- Selection and breeding for desirable traits
- Characterization of genetic elements (Mendel)
- Modification of individual genes (Transgenesis)



Zona pellucida

Uterus

2-cell stage

First cleavage

Oviduct

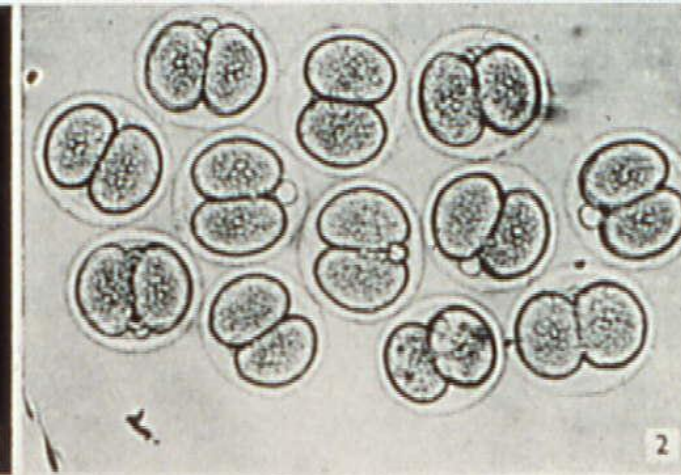
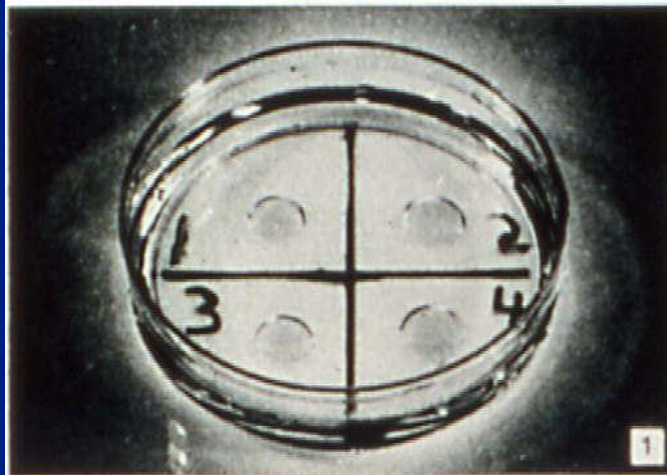
Morula

Ovary

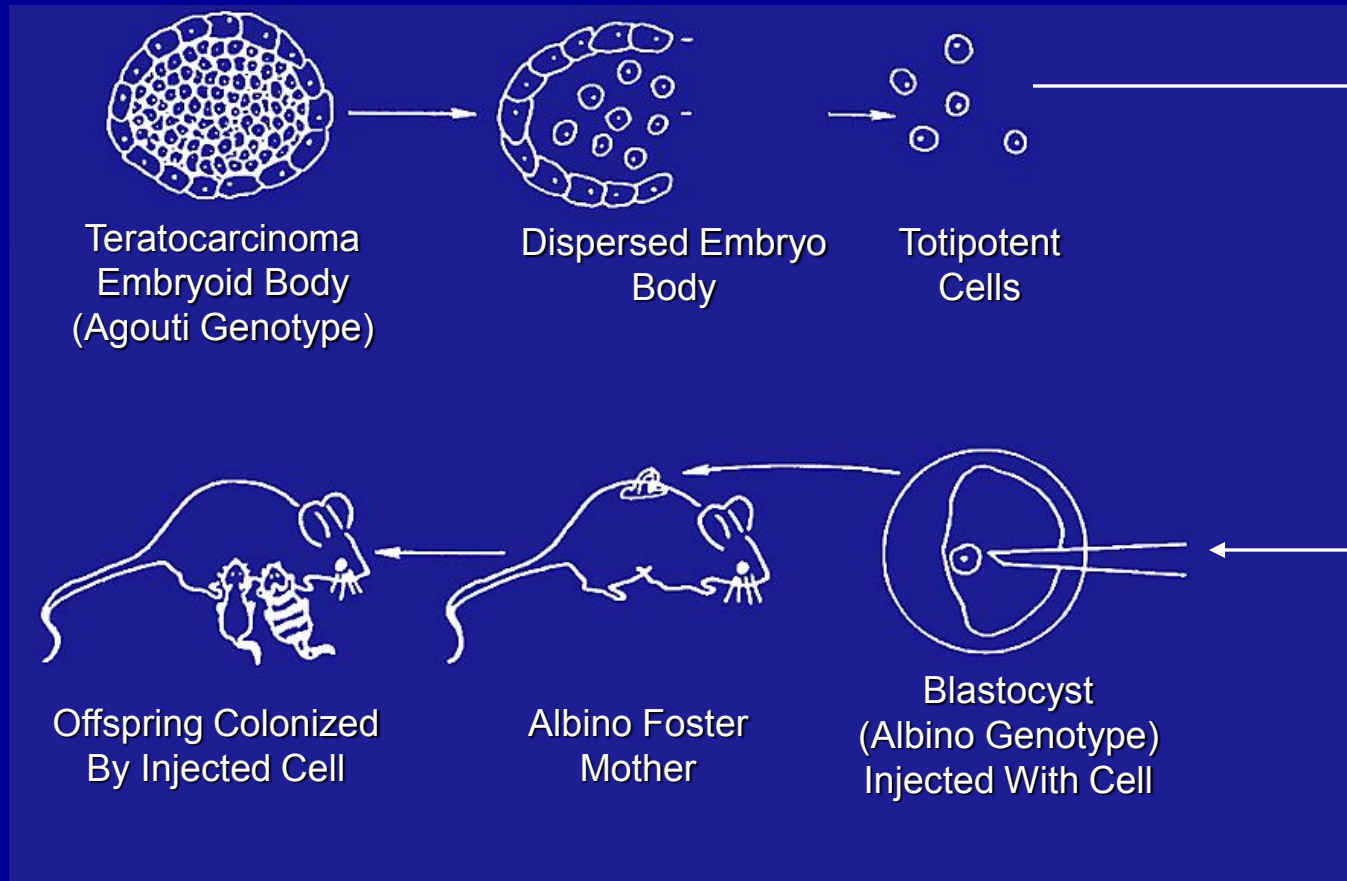
Blastocyst

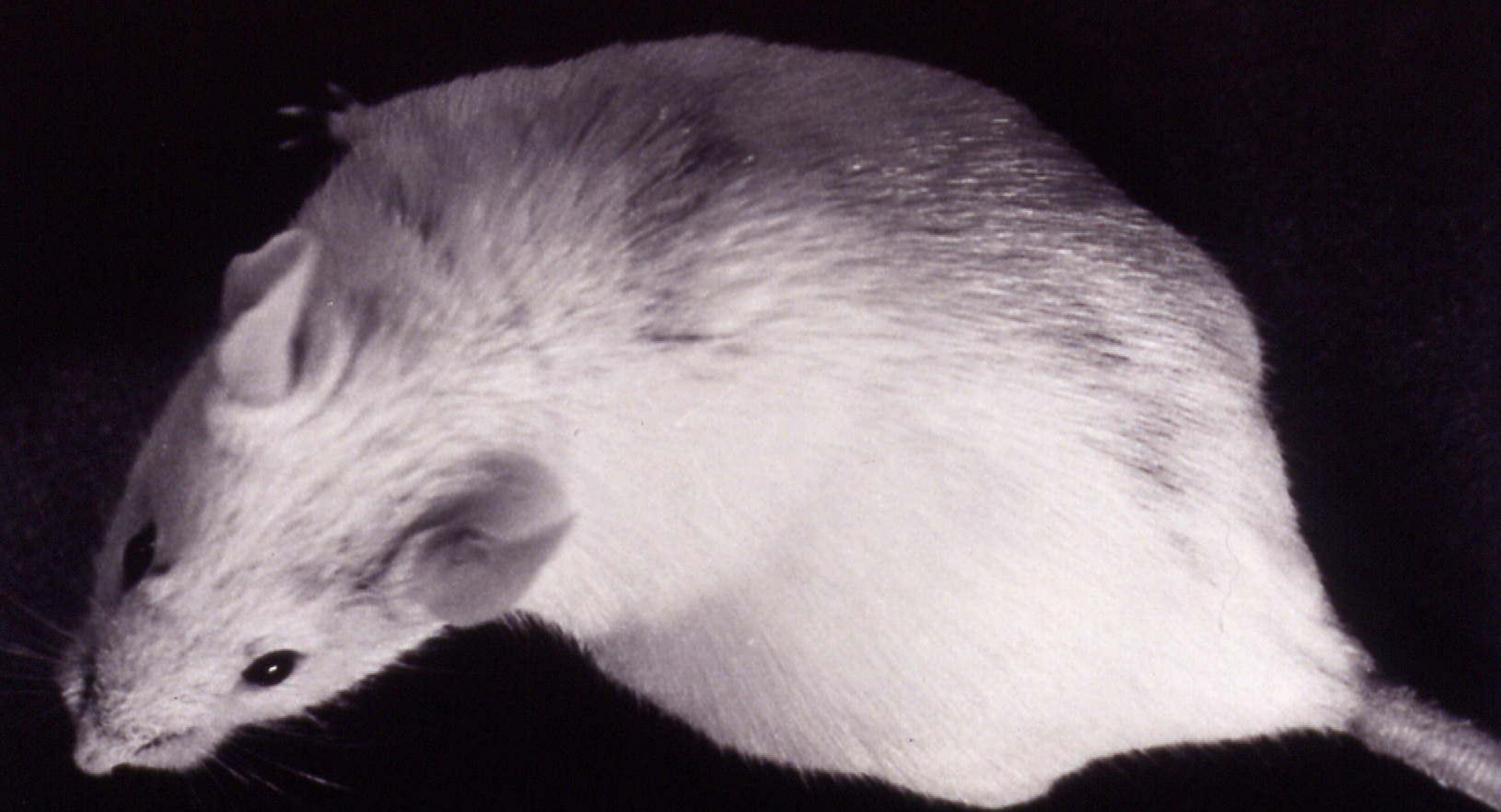
Fertilization

Early stage of implantation



Introduction of New Genetic Information Into the Mouse







R.L. Brinster, H.Y. Chen, M.E.
Trumbauer & M.R. Avarbock,
Nature, 283:499, January 1980



R.L. Brinster, H.Y. Chen,
M. Trumbauer, A.W. Seneor,
R. Warren & R.D. Palmiter,
Cell, 27: 223, 1981

nature

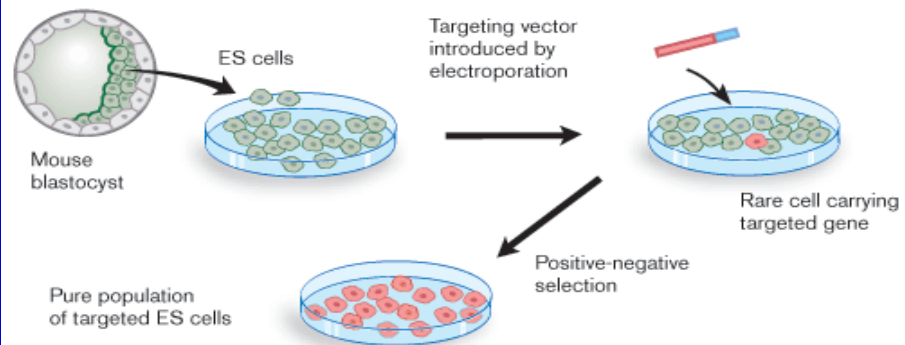
Vol 300 No 5893 16-22 December 1982 £1.80 \$4.50



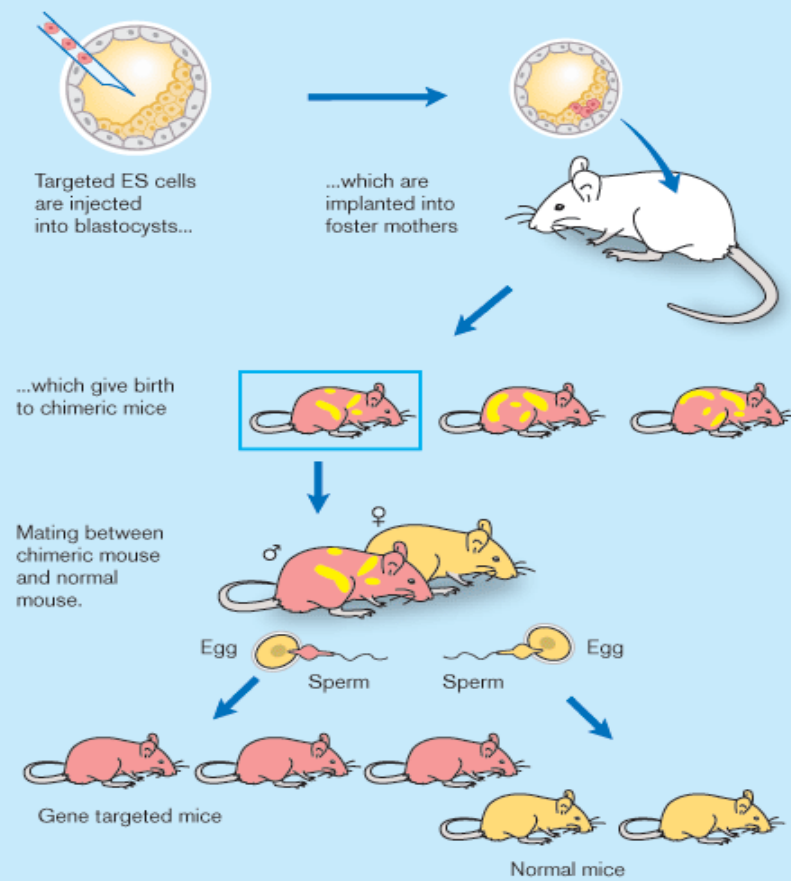
**GIGANTIC MICE - FROM EGGS
INJECTED WITH GROWTH HORMONE GENES**

A MILLISECOND PULSAR

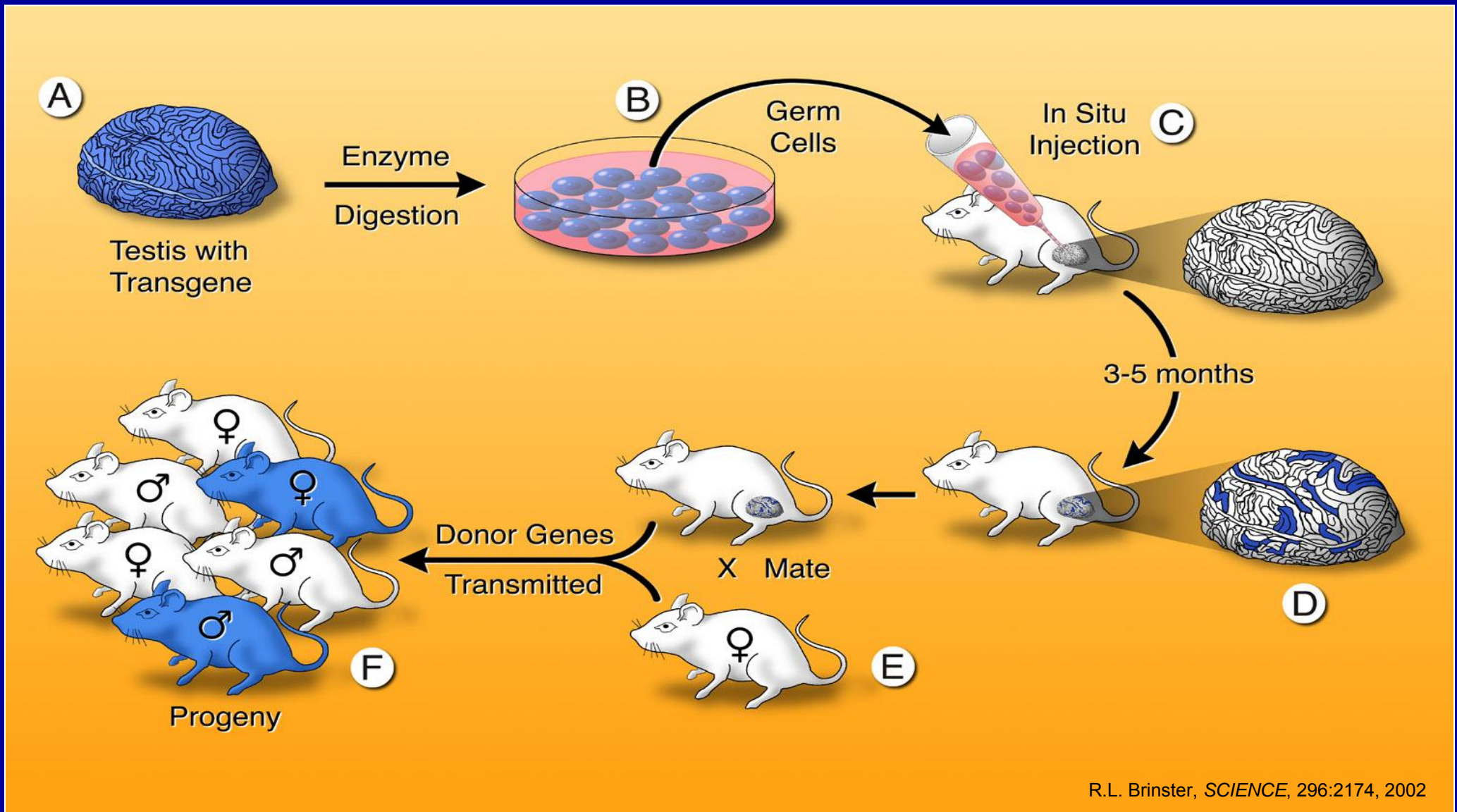
A. Gene targeting of embryonic stem cells



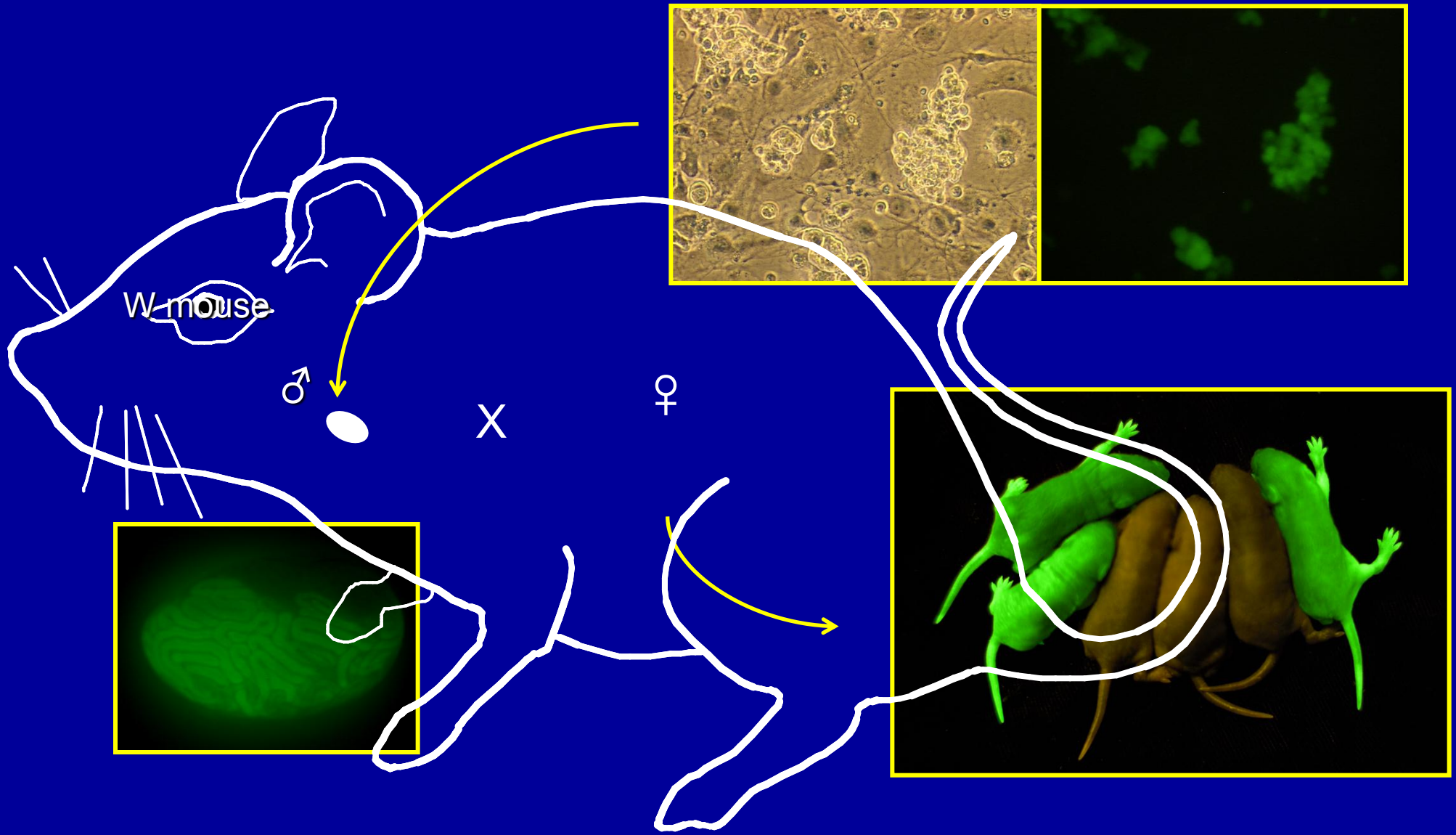
B. Generation of gene targeted mice



Spermatogonial Stem Cell Transplantation



Transplantation of Cultured Spermatogonial Stem Cells into Infertile Male Mouse Restores Fertility



Egg Culture	(1963)
Teratocarcinoma Stem Cells	(1974)
Transgenic Animals	(1981)
Knockout Transgenics	(1989)
Spermatogonial Transplantation	(1994)
Induced Pluripotent Cells	(2006)



Courtesy of Karl Fredga