

Immunogenetics I

Mammals with genomes sequenced

Comparative genomics



15.2. - 16.2.
2001

and few

others (rhesus
macaque, dog, cat,
opossum, armadillo,
platypus, ...



5.12.2002

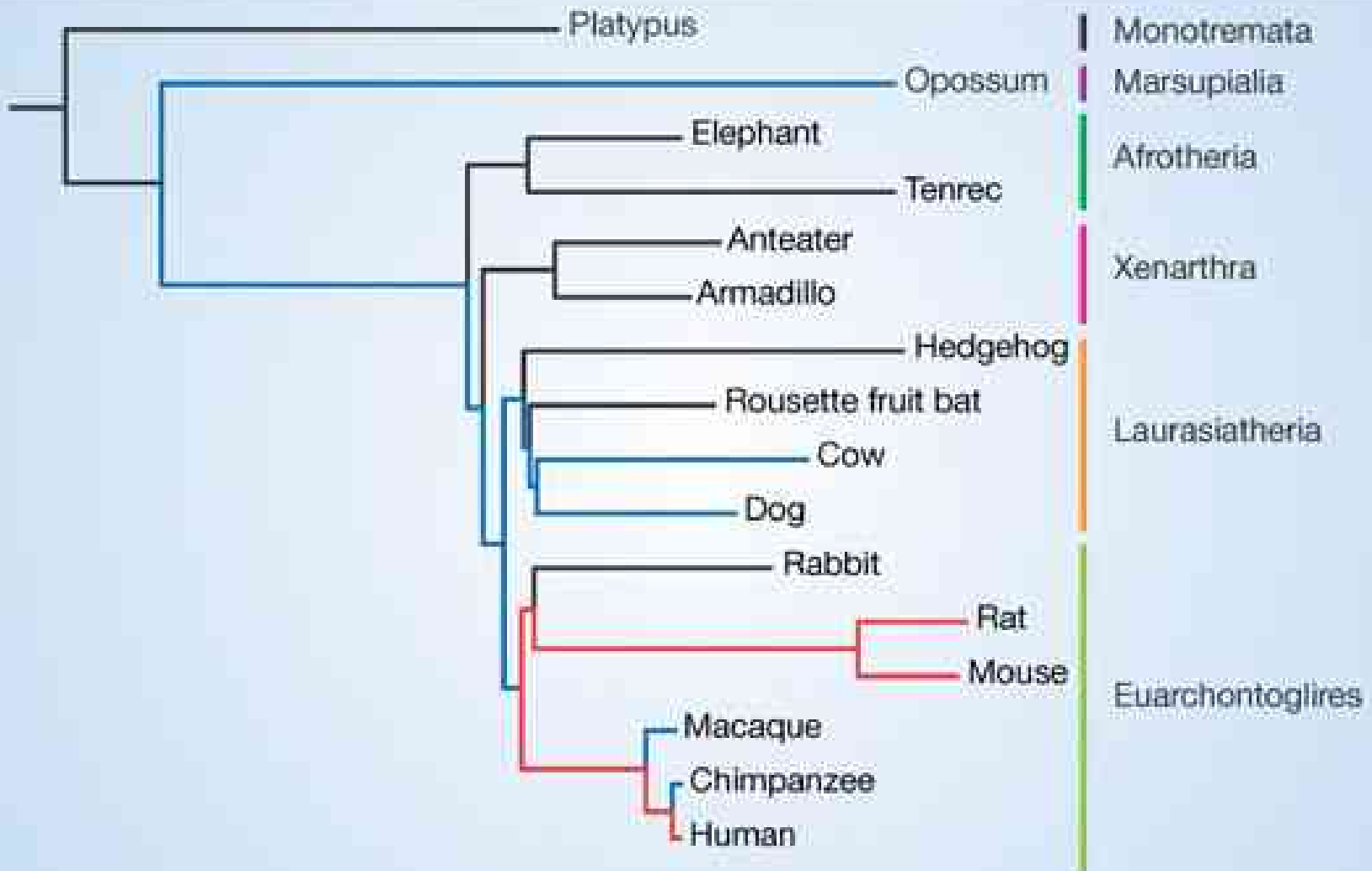


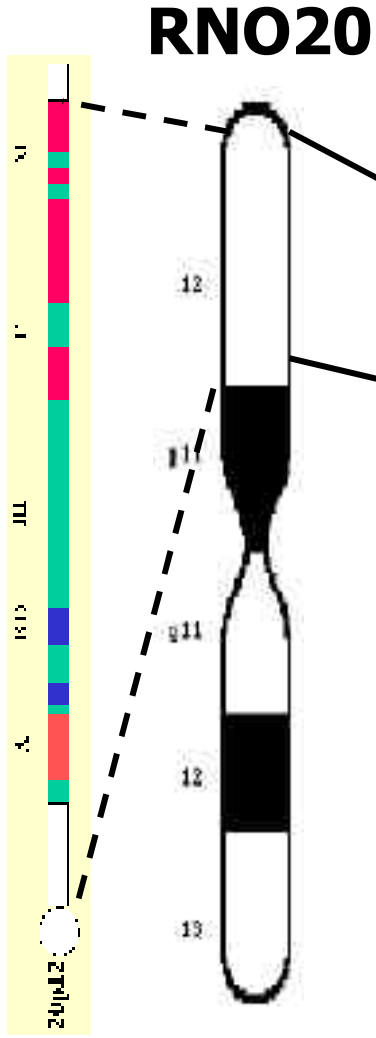
1.4.2004



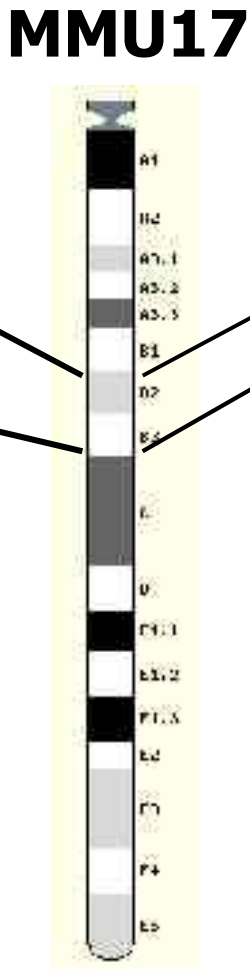
1.9.2005

Rat and mouse are relevant models for human genetics

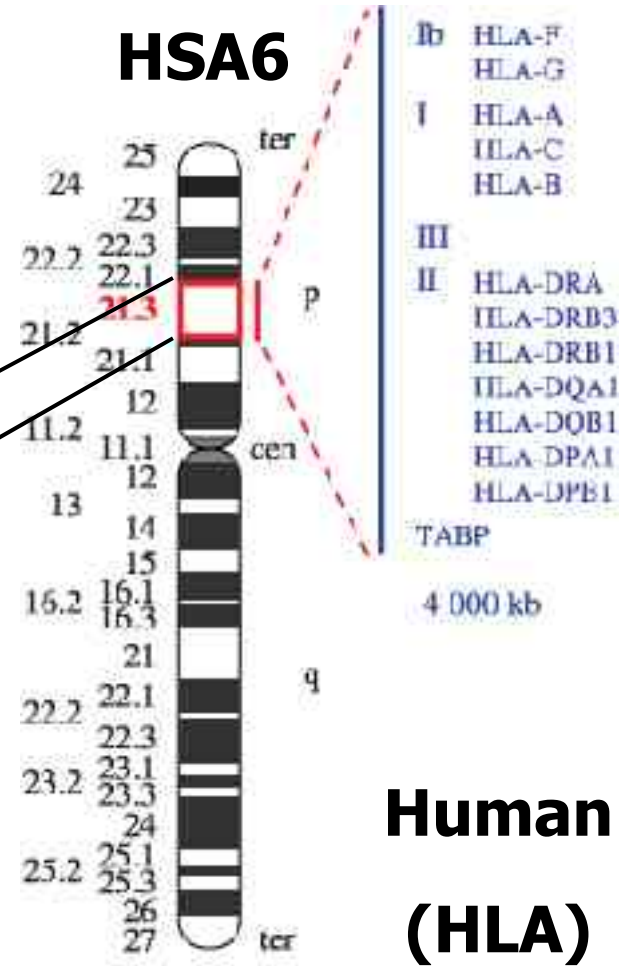




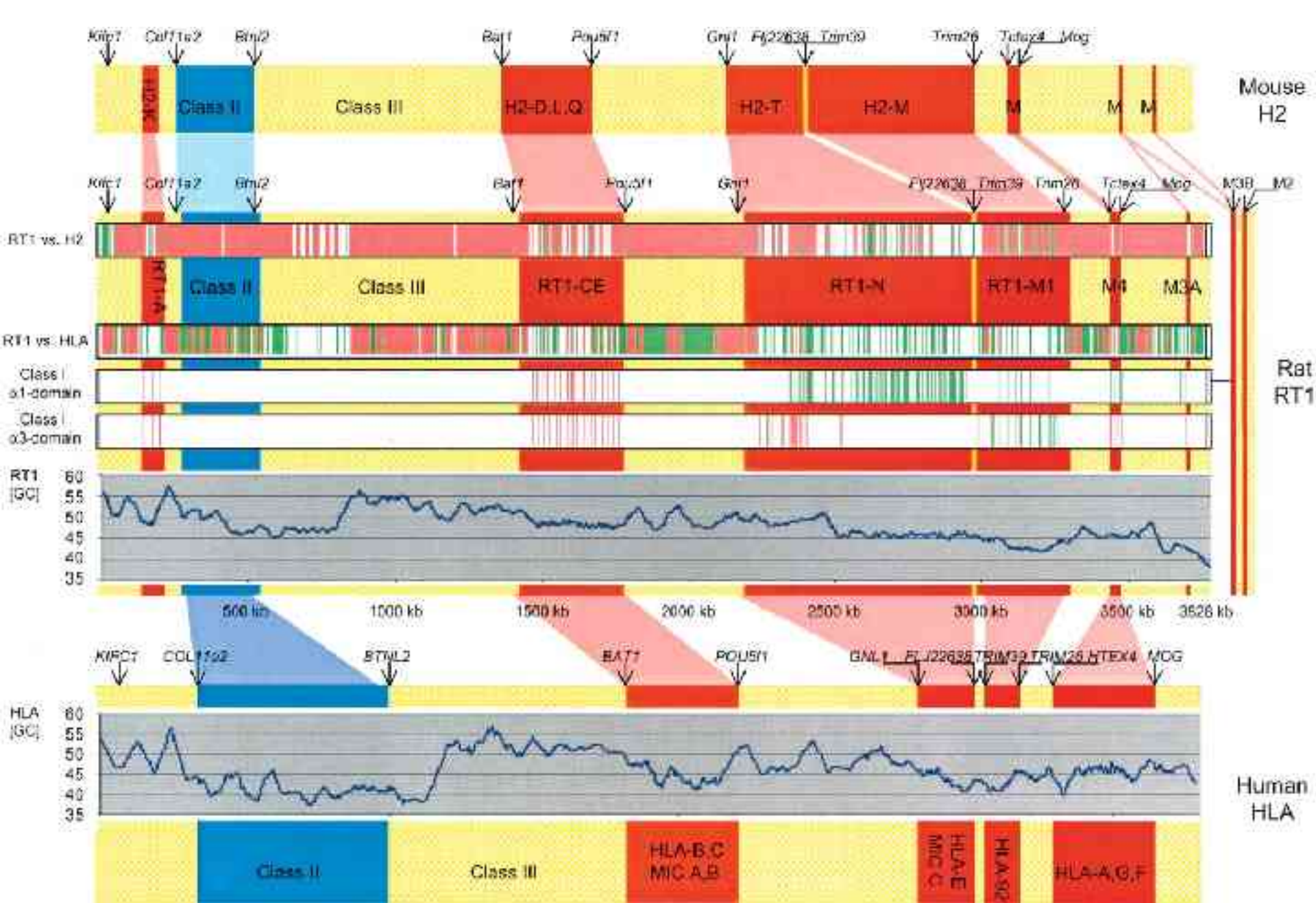
**Rat
(RT1)**



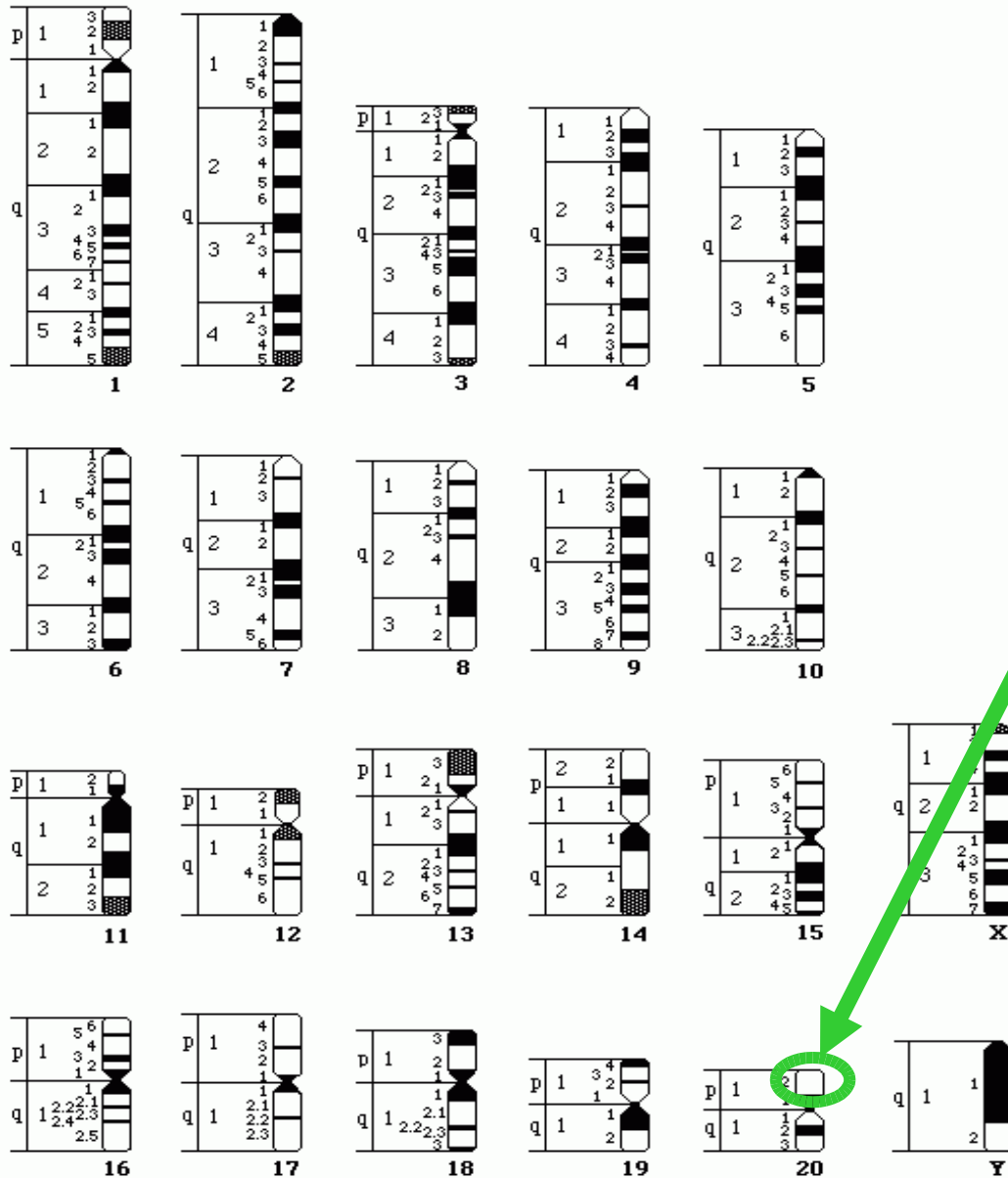
**Mouse
(H-2)**



**Human
(HLA)**



Congenic rat strain for MHC (RT1)

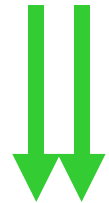


BN

Segment of Chr.20
(incl. MHC)

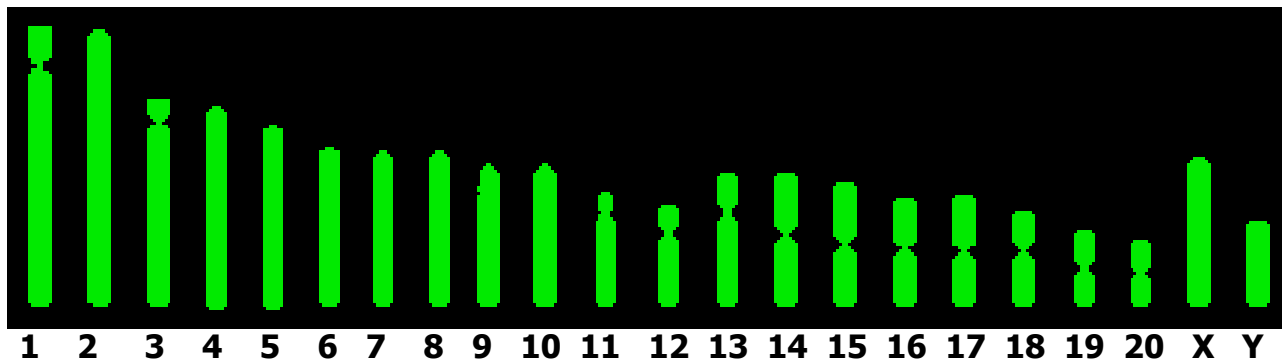


SHR

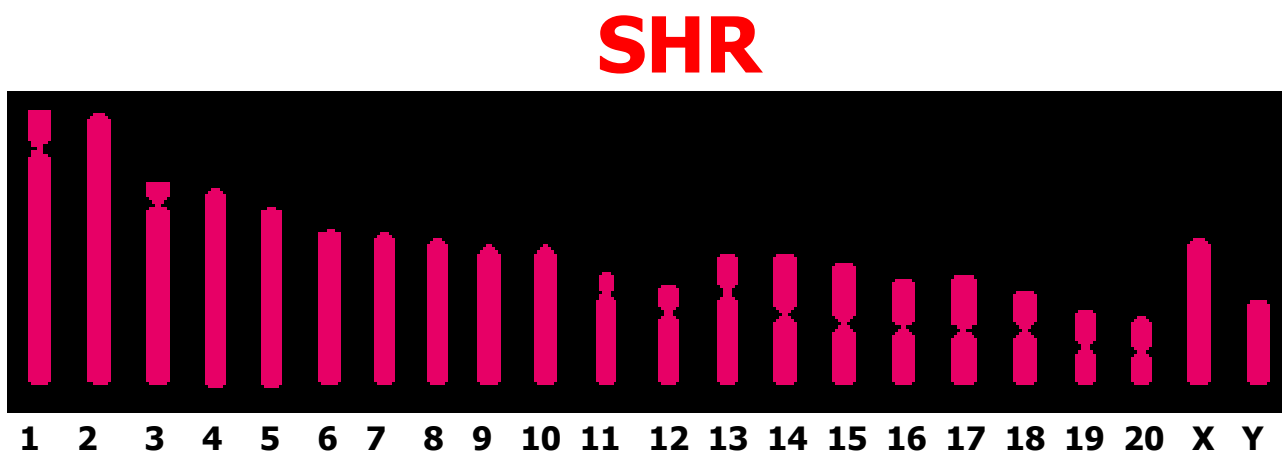


SHR.BN20

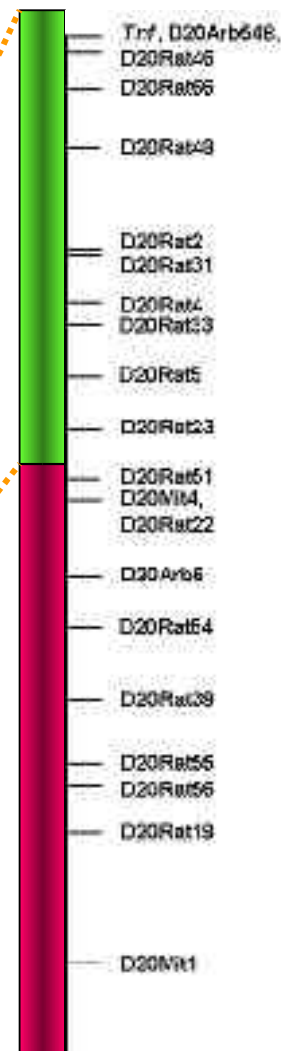
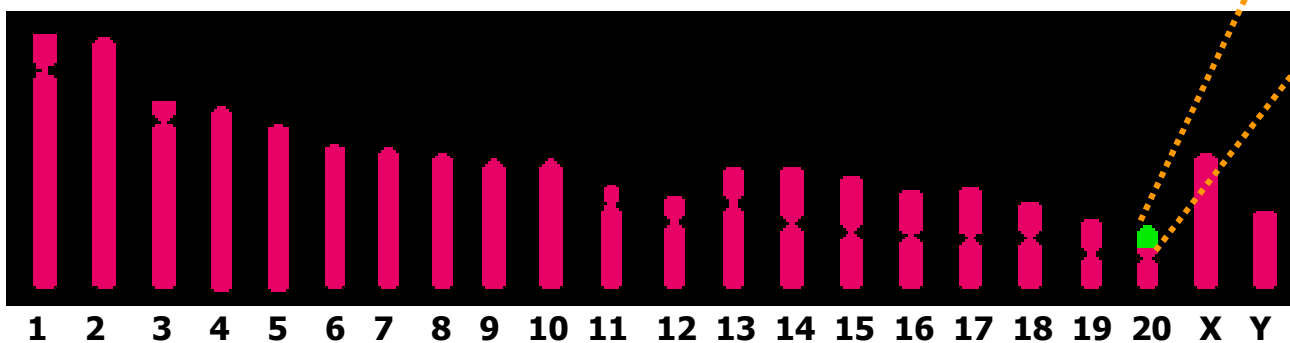
BN



SHR.BN20

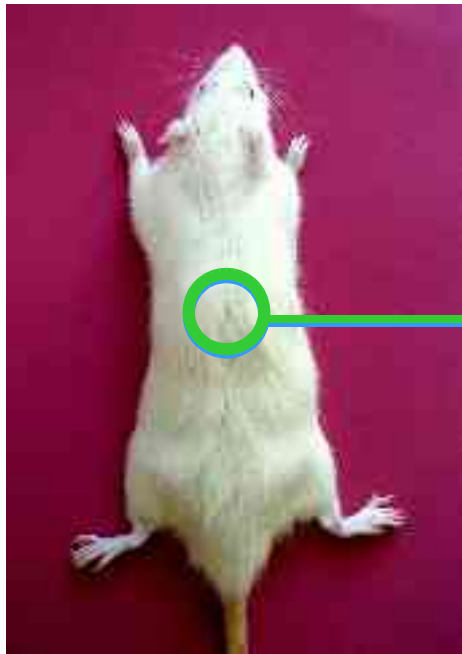


SHR.BN20



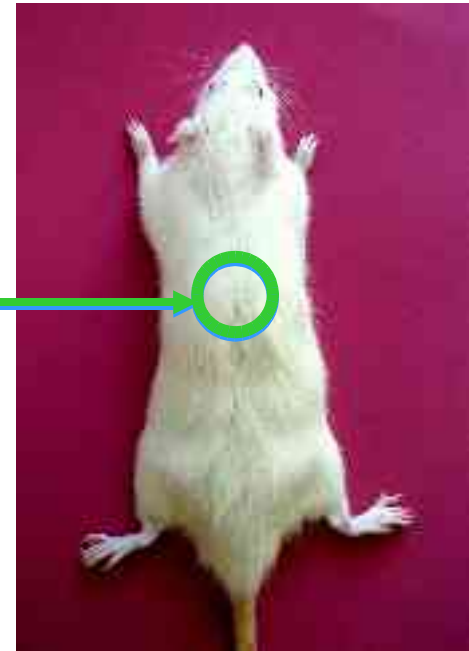
TRANSPLANTATION OF THE SKIN

RESULT: permanent graft take



Inbred STRAIN A

Genotype *aa*



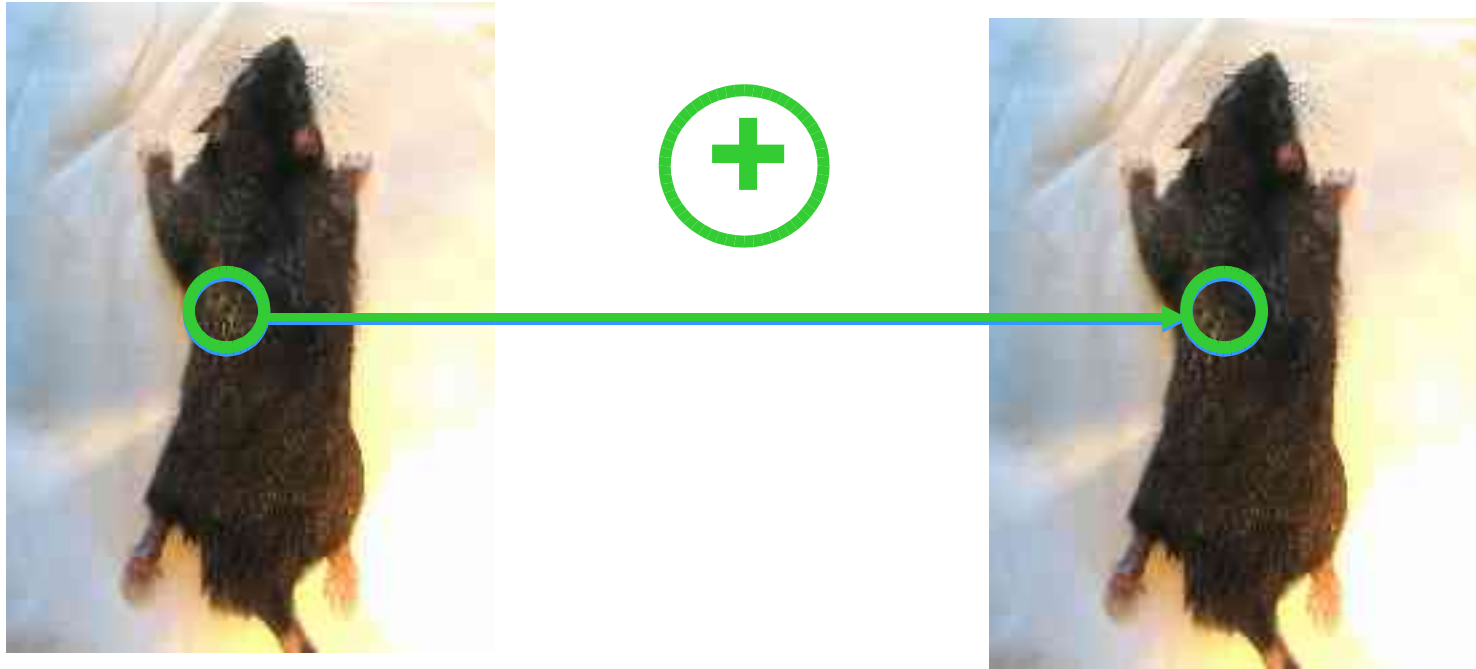
Inbred STRAIN A

Genotype *aa*

SYNGENIC TRANSPLANTATION

TRANSPLANTATION OF THE SKIN

RESULT: permanent graft take



Inbred STRAIN B

Genotype *bb*

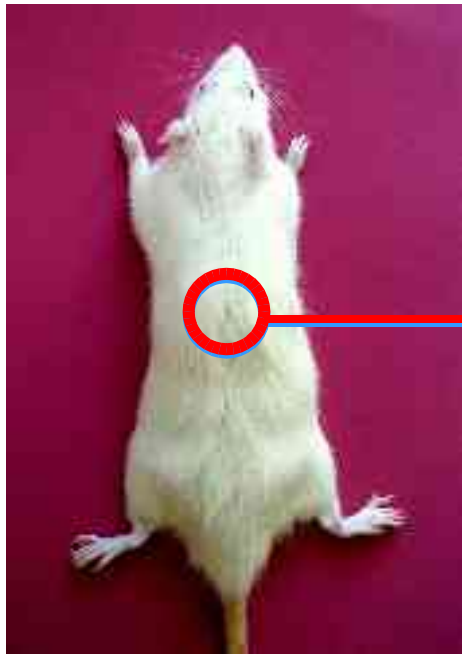
Inbred STRAIN B

Genotype *bb*

SYNGENIC TRANSPLANTATION

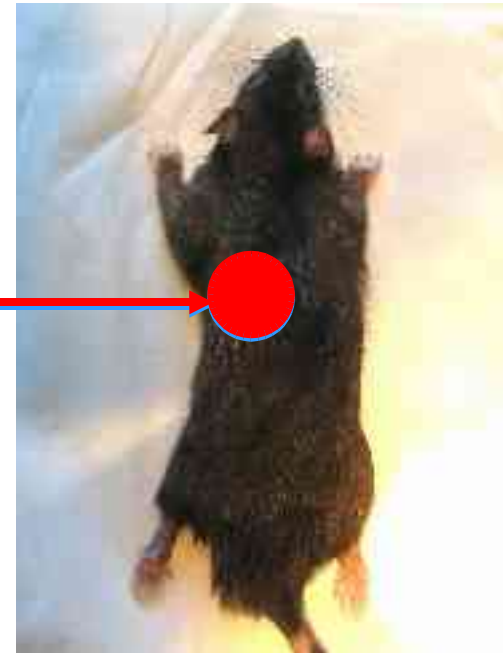
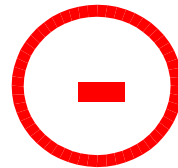
TRANSPLANTATION OF THE SKIN

RESULT: graft rejection



Inbred STRAIN A

Genotype *aa*



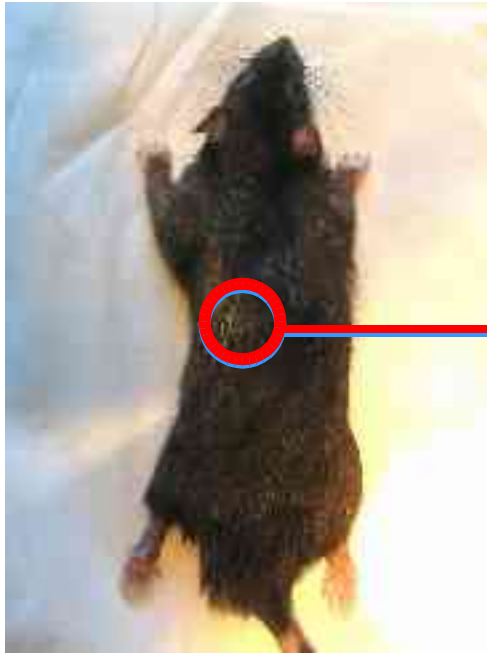
Inbred STRAIN B

Genotype *bb*

ALOGENIC TRANSPLANTATION

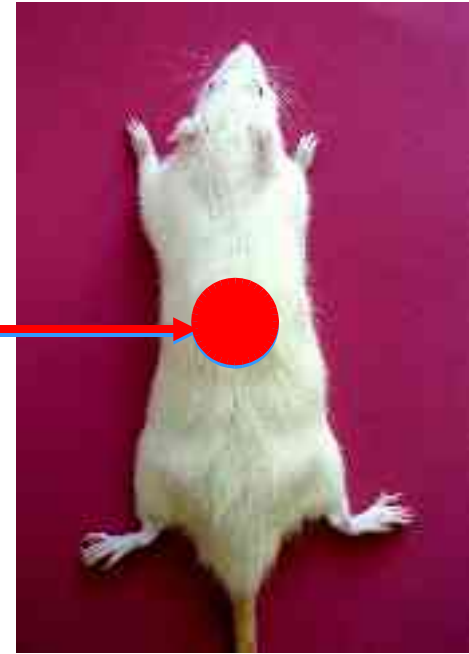
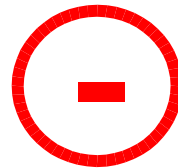
TRANSPLANTATION OF THE SKIN

RESULT: graft rejection



Inbred STRAIN B

Genotype *bb*



Inbred STRAIN A

Genotype *aa*

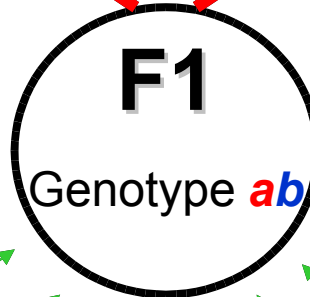
ALOGENIC TRANSPLANTATION

TRANSPLANTATION RULES

Inbred
STRAIN A
Genotype *aa*



Inbred
STRAIN B
Genotype *bb*



ab x *ab*

F2

aa

ab

ab

bb

aa

ab

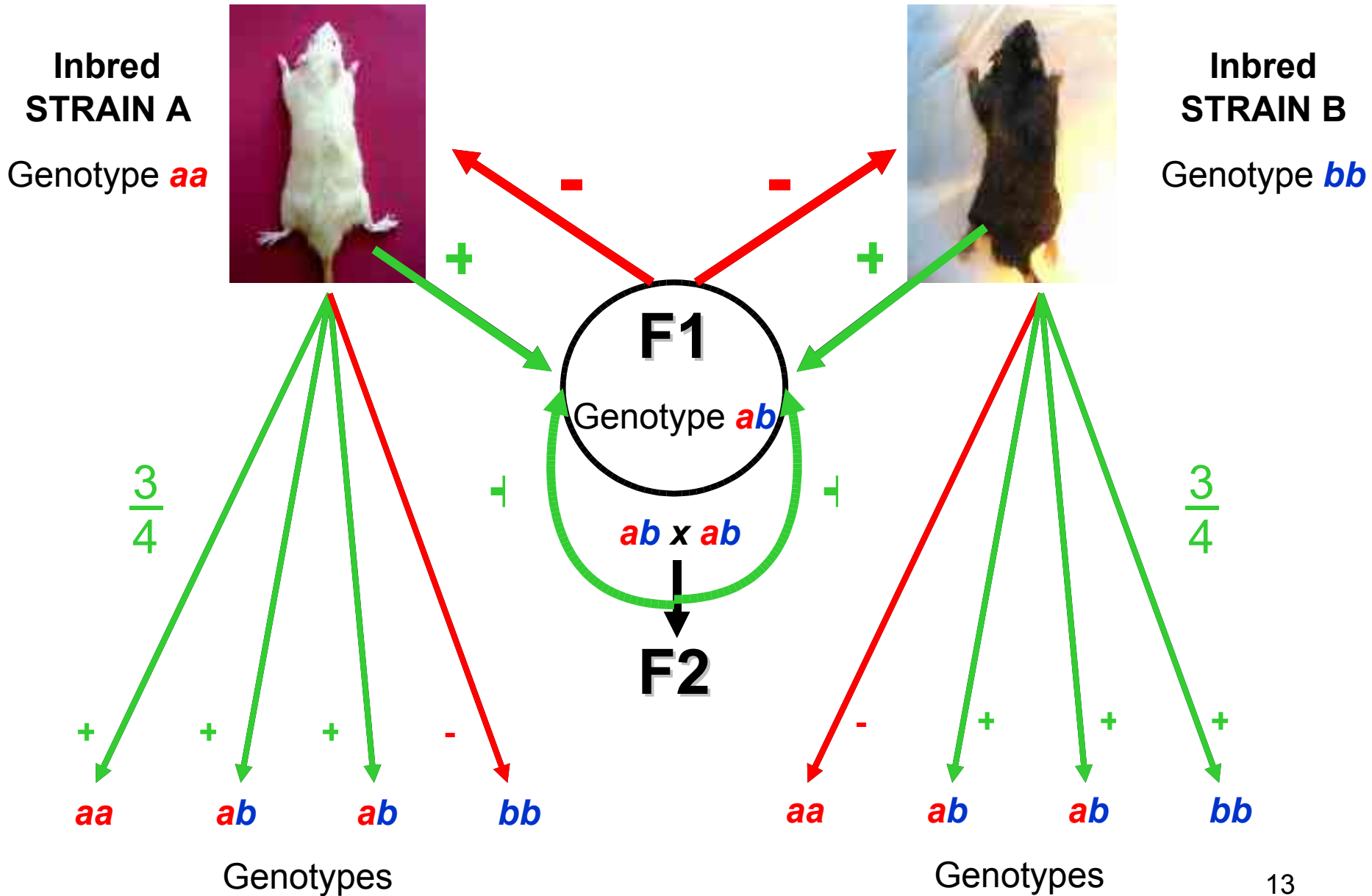
ab

bb

Genotypes

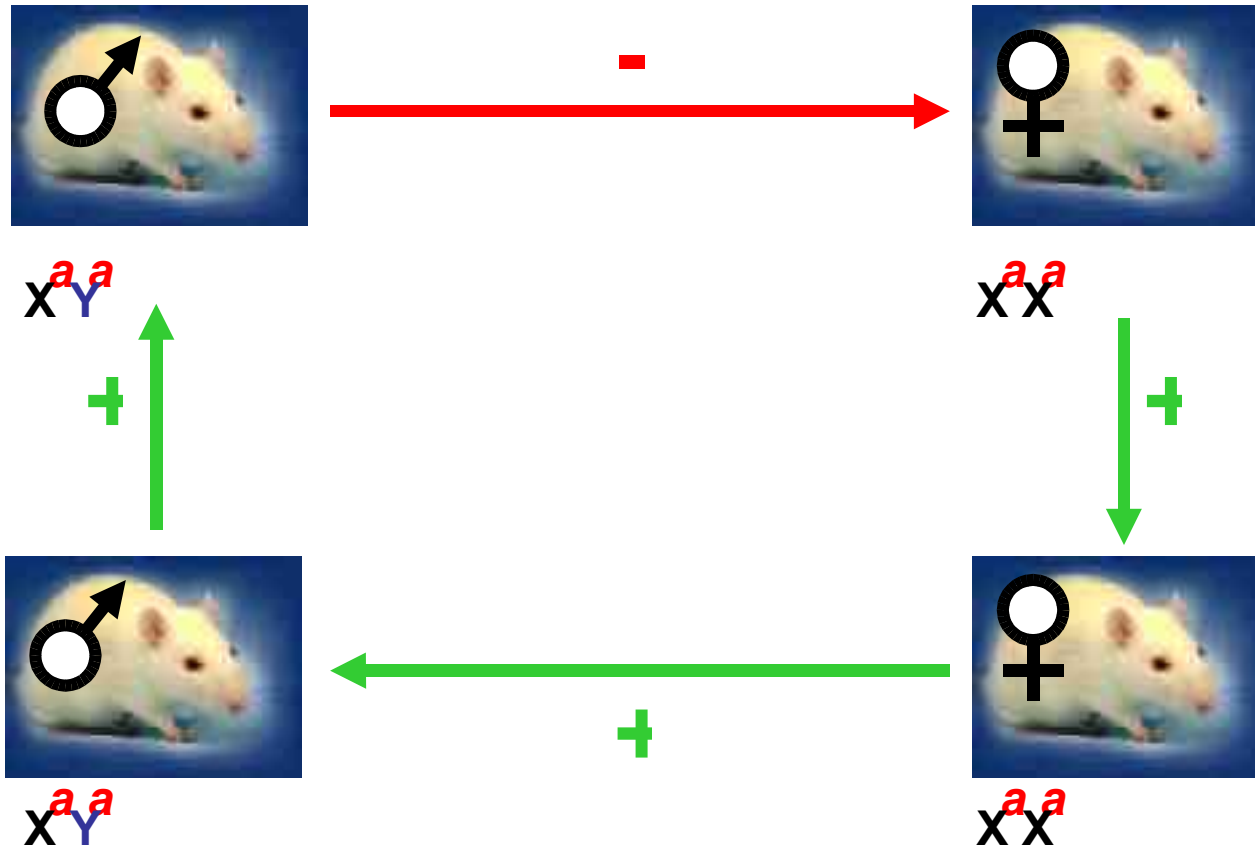
Genotypes

TRANSPLANTATION RULES



EXCEPTIONS FROM TRANSPLANTATION RULES I.

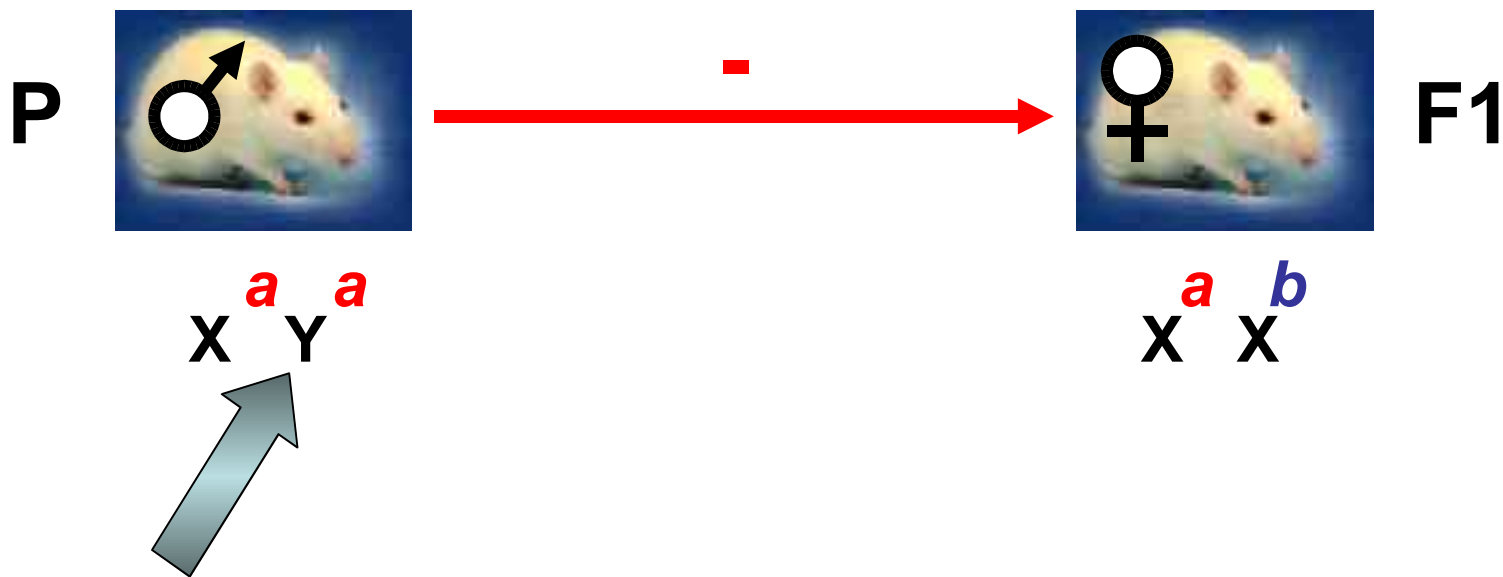
Unsuccessful transplantation of the skin from male to female rats within one inbred strain.



Expression of the male transplantation antigen coded by H-locus on chromosome Y (immune response anti-H-Y).

EXCEPTIONS FROM TRANSPLANTATION RULES II.

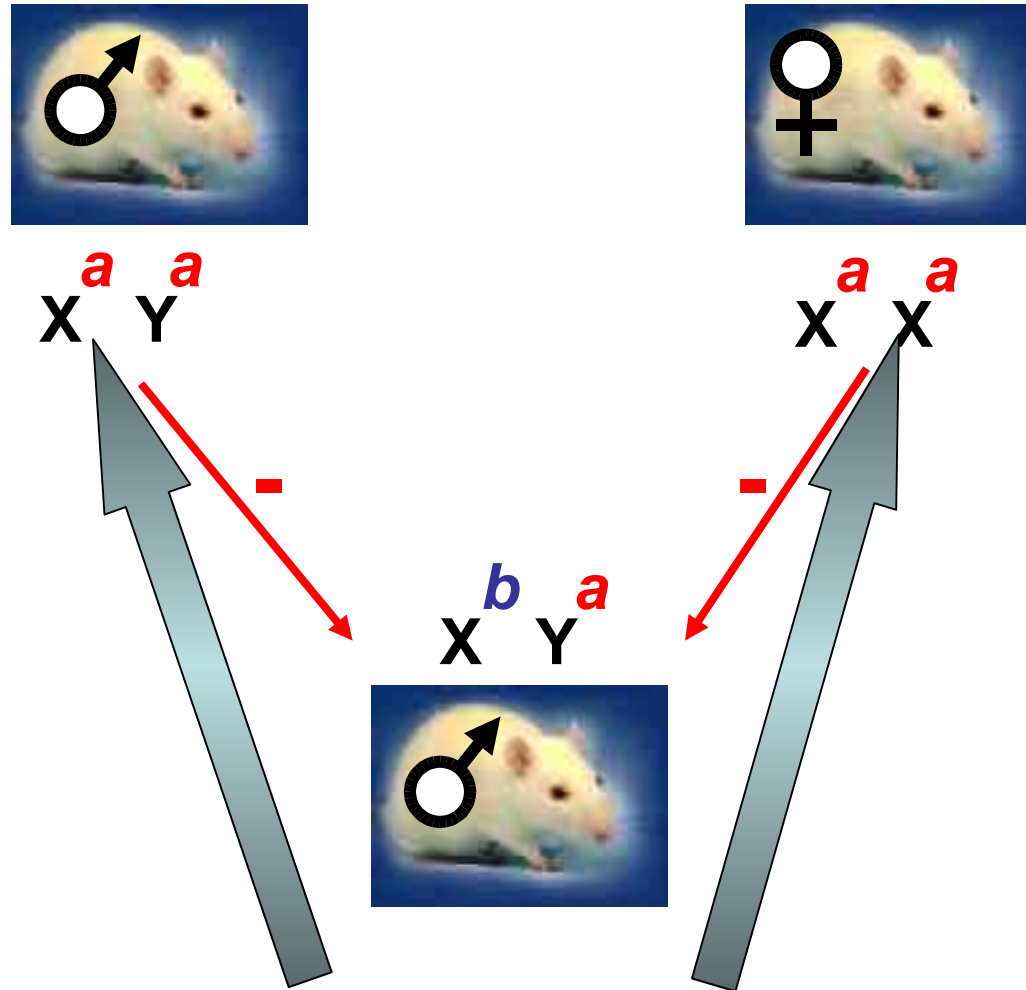
Unsuccessful transplantation of the skin from parental strain male to F1 female.



Reaction against H-Y antigen

EXCEPTIONS FROM TRANSPLANTATION RULES III.

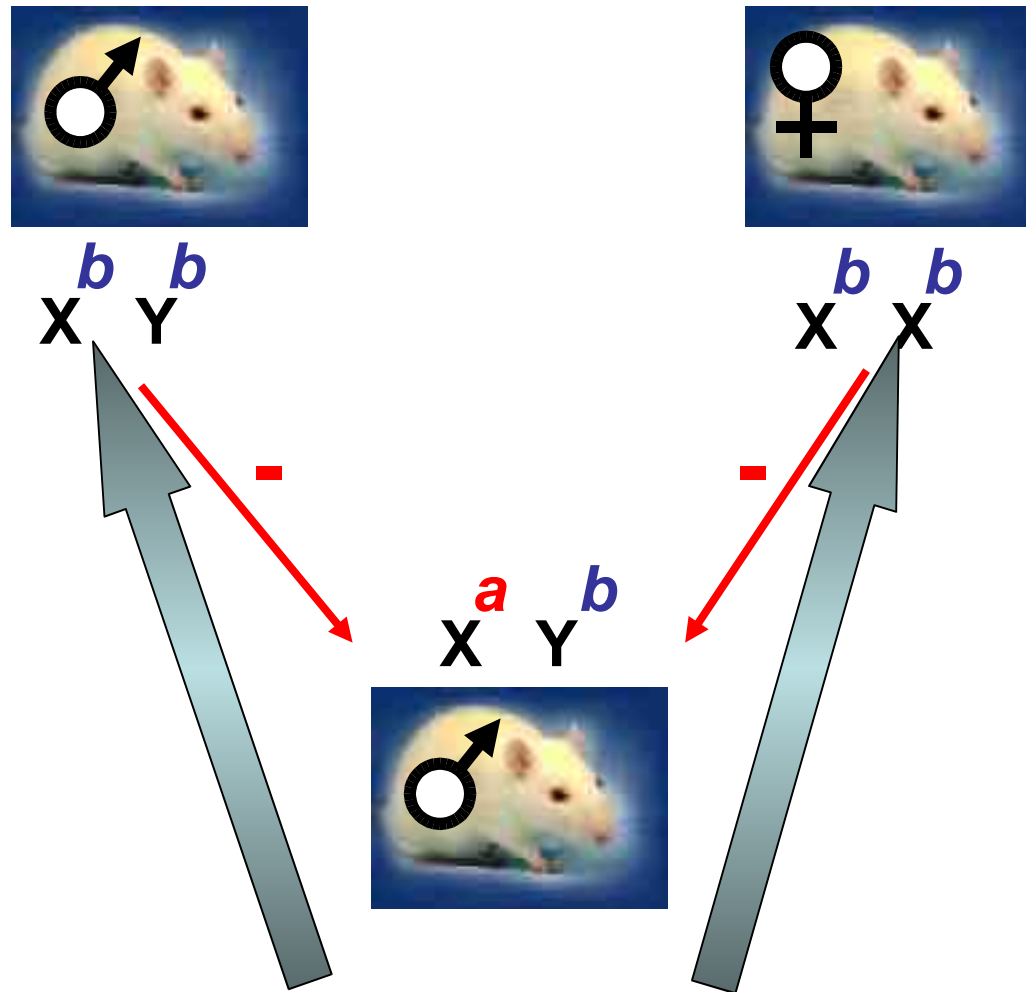
Unsuccessful transplantation of the skin from paternal strain rats to F1 male.



Response against H-X antigen of strain **A**

EXCEPTIONS FROM TRANSPLANTATION RULES III.

Unsuccessful transplantation of the skin from paternal strain rats to F1 male.



Response against H-X antigen of strain B

HOST vs. GRAFT REACTION

Transplantation of skin, kidney or other organ without lymphoid cells capable of immune reaction

Graft genotype	Host genotype	Graft-take		
		newborn	adult	Lethally irradiated
aa	aa	+	+	+
aa	bb	+	-	+
aa	ab	+	+	+
ab	aa	+	-	+

- graft rejected

+ graft-take

GRAFT vs. HOST REACTION

Transplantation of BONE MARROW, LYMPHOCYTES

Graft genotype	Host genotype	LETHAL EFFECT (GvHR)		
		newborn	adult	Lethally irradiated
aa	aa	-	-	-
aa	bb	+	-	+
aa	ab	+	+	+
ab	aa	-	-	-

- HOST SURVIVES

+ HOST DIES

GRAFT vs. HOST REACTION

Transplantation of BONE MARROW, LYMPHOCYTES

Graft genotype	Host genotype	LETHAL EFFECT (GvHR)		
		newborn	adult	Lethally irradiated
A aa	A aa	-	-	-
B bb	B bb	-	-	-
A aa	B bb	+	-	+
B bb	A aa	+	-	+

- HOST SURVIVES

+ HOST DIES

GRAFT vs. HOST REACTION

Transplantation of BONE MARROW, LYMPHOCYTES

Graft genotype	Host genotype	LETHAL EFFECT (GvHR)		
		newborn	adult	Lethally irradiated
F1(AxB) ab	A aa	-	-	-
F1(AxB) ab	B bb	-	-	-
A aa	F1(AxB) ab	+	+	+
B bb	F1(AxB) ab	+	+	+

- HOST SURVIVES

+ HOST DIES

GRAFT vs. HOST REACTION

Transplantation of BONE MARROW, LYMPHOCYTES

Graft genotype	Host genotype	LETHAL EFFECT (GvHR)		
		newborn	adult	Lethally irradiated
F2(AxB) aa	F1(AxB) ab	+	+	+
ab	ab	-	-	-
ba	ab	-	-	-
bb	ab	+	+	+

- HOST SURVIVES

+ HOST DIES

GRAFT vs. HOST REACTION

Transplantation of BONE MARROW, LYMPHOCYTES

Graft genotype	Host genotype	LETHAL EFFECT (GvHR)		
		newborn	adult	Lethally irradiated
A aa	F2(AxB) aa	-	-	-
	ab	+	+	+
	ba	+	+	+
	bb	+	-	+

- HOST SURVIVES

+ HOST DIES

GRAFT vs. HOST REACTION

Transplantation of BONE MARROW, LYMPHOCYTES

Graft genotype	Host genotype	LETHAL EFFECT (GvHR)		
		newborn	adult	Lethally irradiated
B bb	F2(AxB) aa	+	-	+
	ab	+	+	+
	ba	+	+	+
	bb	-	-	-

- HOST SURVIVES

+ HOST DIES