

Conventional allelic / genetic symbols:

Incomplete (or Partial) Dominance: both alleles are expressed in phenotype creating an intermediate phenotype. Example: Red, White and Pink flowers

Codominance: both alleles express in phenotype creating a phenotype with both allelically based characteristics. MN blood groups (chromosome 4)

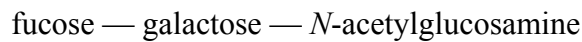
Genotype	Phenotype
$L^M L^M$	M
$L^M L^N$	MN
$L^N L^N$	N

Multiple alleles modifying simple Mendelian ratios: ABO blood groups (chromosome 9) "isoagglutininogen" with alleles designated as:

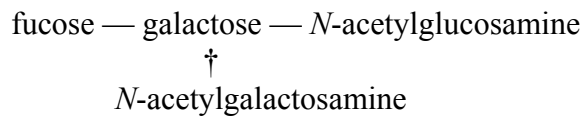
Allele	Antigen produced	Phenotypic expression
I^A	A	A (codominant)
I^B	B	B (codominant)
I^O	Neither	O (recessive)

Genotype	Antigen production	Phenotype
$I^A I^A$	A	A
$I^A I^O$	A	A
$I^B I^B$	B	B
$I^B I^O$	B	B
$I^A I^B$	A, B	AB
$I^O I^O$	Neither	O

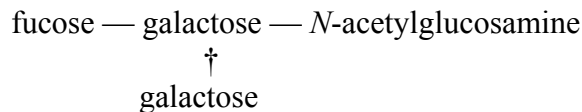
ABO antigens based upon the **H substance**, a chain of three sugar molecules:



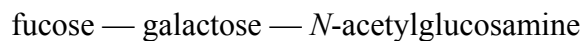
I^A creates enzyme that attaches *N*-acetylgalactosamine to galactose sugar of H substance:



I^B creates enzyme that attaches another galactose to galactose sugar of H substance:



I^O creates neither enzyme:



Bombay phenotype: type AB mother has daughter with type O blood. Recessive allele from each parent prevents proper creation of the H substance. Double recessive, *hh*, produced H substance that lacked terminal fucose sugar. Enzymes that attach either *N*-acetylgalactosamine or galactose to the galactose of the H substance can not recognize the galactose of the H substance unless fucose is also present.

Lethals: recessive homozygous, do not express in phenotype as heterozygotes and are lethal as homozygotes

dominant homozygous, express in phenotype in heterozygotes and are lethal as homozygotes (yellow allele in mice)

dominant heterozygous, express in phenotype only after age of reproduction (Huntington disease)

Two traits and the modification of Mendelian ratios due to multiple alleles at one locus:
e.g., albinism (recessive) and ABO blood group. Heterozygotes at both loci (Aa, AB) cross.

If it comes in 16ths, it's probably the result of two loci.

Epistasis and modification of Mendelian ratios:

1. homozygous recessive at one locus masks expression at second locus (Bombay phenotype)
2. single dominant allele at one locus sufficient to express second locus - complete the trait.

e.g. white color in squash:	A-,B-	white
	A-,bb	white
	aa,B-	yellow
	aa,bb	green

3. both loci must have dominant alleles to express trait

e.g. white flowered sweet peas:	A-,bb	white
	aa,B-	white
AA,bb	X	aa,BB = purple (Aa,Bb)

