

# INDEPENDENT ASSORTMENT

16 Jan 2008, 23 Jan 08, 16Jan09, 15Jan10  
 GWLC 9<sup>th</sup>, pp102-119

During meiosis (gametogenesis)

Independent assortment of two gene pairs is due to them being on **different chromosomes**. Because each allelic set segregates with equal probability  
 Random chance determines which cell heterozygous pairs segregate.

See illustration on p 104: Aa/Bb selfed:

Note that a genotype Aa/Bb produces four different genotypes of gametes AB  
Ab  
 each with equal frequency in the gamete (1/4th each) aB  
ab

This variation is **set up at meiosis metaphase I**, and fixed at **anaphase I**.

A **TEST CROSS** is used to demonstrate this frequency or to test for heterozygosity:  
 (Aa/Bb x aa/bb) or (A<sup>?</sup>/B<sup>?</sup> x aa/bb) (page109)

Note that half of the progeny is different that the parents, = recombinant.

rec. freq: **number of recombinant phenotypes/ total progeny = 50%**

**Polygenic inheritance:**

if more than one set of genes contribute to the phenotype, it can lead to continuous variation:

R<sub>1</sub>R<sub>1</sub>/R<sub>2</sub>R<sub>2</sub> (deep red) x r<sub>1</sub>r<sub>1</sub>/r<sub>2</sub>r<sub>2</sub> (white)

F1: R<sub>1</sub>r<sub>1</sub>/R<sub>2</sub>r<sub>2</sub> (Pink)

F2: range from having contributing to redness of wheat seed (Nilsson-Ehle). A form of gene dosage.

genotype	phenotype	frequency
four R genes	Deep red	1/16 (R1R1/R2R2)
Three	Dark pink	4/16
Two	Pink	6/16
One	Light pink	4/16
None	White	1/16 (r1r1/r2r2)

Note bell shaped curve on p 111.

Skin color in humans is an example, siblings can have continuous variation of darkness (if 3 genes, seven phenotypes)

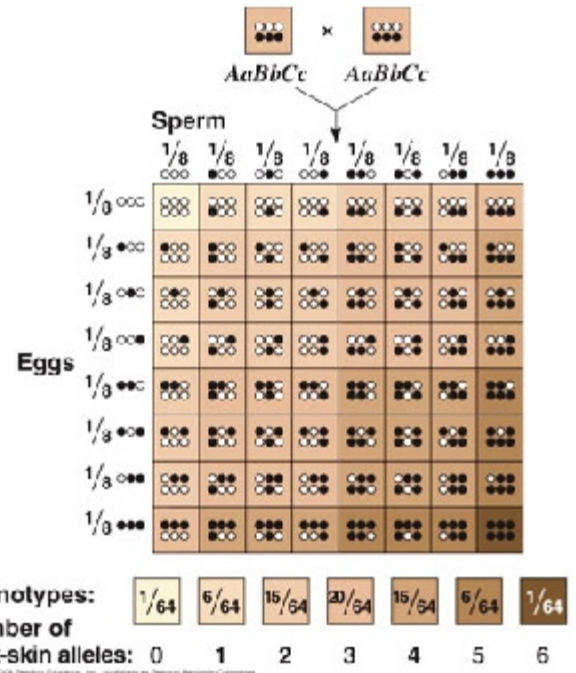
**ORGANELLE INHERITANCE:  
 INDEPENDENT OF NUCLEUS**

Best example is mitochondrial inheritance in humans:

**Maternal inheritance**

mitochondria have their own DNA, only mitochondria in eggs are inherited, sperm mitochondria excluded.

P 117 maps mtDNA mutations, inherited through maternal line.  
 (Pedigree on p 118: 100% progeny of affected mother)



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