**Mendelian Genetics**

**Concept 2:** Analyzing the effects of complex genetic crosses such as

**incomplete/co- dominance, multiple alleles, pleiotropy, epistasis, polygenetics, and lethal alleles.**

Degrees of Dominance

**Complete Dominance**

**Homozygous Dominant** and **Heterozygous** are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Monohybrid Phenotypic Ratio 🡪

**Incomplete Dominance**

**Heterozygotes** display a **\_\_\_\_\_\_\_\_\_\_\_\_\_\_** phenotype

Monohybrid Phenotypic Ratio 🡪

**Co-dominance**

**Heterozygotes** display \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (separate, distinguishable)

Monohybrid Phenotypic Ratio  🡪

Multiple Alleles

Many alleles for \_\_\_\_\_\_\_\_ gene

**Example**: If a male with blood type AB has children with a female with blood type O, what is the predicted phenotypic ratio of their children?



Pleiotropy

One gene that has \_\_\_\_\_\_\_\_\_\_\_\_ effects on phenotypic characters

Epistasis

One gene having an effect over \_\_\_\_\_\_\_\_\_\_\_ gene

**Example**:

In corn, a dominant allele “***I* “** inhibits kernel colour, while the recessive allele **“*i*** “ permits colour when homozygous.

At a different locus, the dominant allele **P** causes purple kernel colour, while the homozygous genotype **pp** causes red kernels.

 If plants heterozygous at both loci are crossed, what will be the phenotypic ratio of the offspring causes red kernels.

Polygenic Inheritance

Two or more genes affecting one \_\_\_\_\_\_\_\_\_\_\_\_\_ character

Quantitative characters – continuum rather than “either/or”

*General Rule*: number of phenotypic classes resulting from a cross of heterozygotes equals the number of alleles involved plus one.

**Try this**

The height of spike weed is a result of polygenetic inheritance involving three genes, each of which can contribute an additional 5cm to the base height of the plant, which is 10cm.  The tallest plant (*AABBCC*) can reach a height of 40cm.

A) If a tall plant (*AABBCC*) is crossed with a base-height plant (*aabbcc*), what is the height of the F1 plants?

B) How many phenotypic classes will there be in the F2?

c) What is the probability of seeing a 20cm plant in the F2 generation?

Lethal Alleles

Recessive lethal allele

2:1 ratio if lethal \_\_\_\_\_\_\_\_\_\_\_ birth

Dominant lethal allele

Must show effects after reproductive age. Why?

Environmental Effects

Hydrangeas - Plant a tin can next to them and see what happens!