Other forms of “Dominance”...

1. Complete dominance:

   - “Mendelian traits” already studied
   - 3:1 result in F2 monohybrid cross
   - 9:3:3:1 in dihybrid if both parents are heterozygous for two traits

2. Incomplete dominance:

   - neither allele of a trait is dominant over the other, what’s expressed is a combination of both alleles (similar to the “Blend Theory” of Mendel’s day)
- white X red snapdragons = PINK

- Punnett squares are done using all capital letters, one letter with a symbol to distinguish it.

  Ex. R for red flower
      R’ for white flower

- traits still follow 2 of Mendel’s 3 Laws....dominance goes out the window

3. Co-Dominance :

- similar to incomplete dominance (neither allele dominant over the other), but what we get is not a
blend....the organism shows BOTH phenotypes at the same time

- black hen X white hen = grizzly hen

4. Multiple Alleles :

- any trait having more than two forms ( alleles )

- ex. Human blood types....
  ( “i” is used for the “O” allele)
  (A and B are co-dominant, but completely dominant over O)

AA or AO........type A
BB or BO........type B
AB.....................type AB
OO....................type O
- ex. Skin tone
  Eye color
  Hair color

- all controlled by multiple alleles in different places of different genes. Their interactions produce many variations.

Human ABO cross examples
Punnett Square practice

Test Crosses:

- mating a creature (whose genotype we are unsure of) with another of known genotype (ex. Homozygous recessive) and observing the results.
- done to determine what alleles are present in the parent.

If recessiveness appears in the offspring, the parent was hybrid.

How can you tell if a trait is a multiple allele trait?

- any observed ratio allows us to conclude how many pairs of alleles are involved in controlling a trait

<table>
<thead>
<tr>
<th>Ratio</th>
<th>Allele Pairs</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:1</td>
<td>1</td>
</tr>
<tr>
<td>9:3:3:1</td>
<td>2</td>
</tr>
<tr>
<td>no ratio</td>
<td>multiple</td>
</tr>
<tr>
<td></td>
<td>pairs on</td>
</tr>
<tr>
<td></td>
<td>multiple</td>
</tr>
<tr>
<td></td>
<td>genes</td>
</tr>
</tbody>
</table>
Test crosses can be done with other creatures, but in humans, we study family pedigree diagrams, showing genetic / family relationships (page 544....symbol key)