CHAPTER 14
VARIATIONS OF INHERITANCE

CODOMINANCE: INCOMPLETE BLENDING TRAIT EFFECT
RED/WHITE/PINK FLOWERS
RED/WHITE/ROAN CATTLE COLOR
P1 RR X rr = F1 = 100% Rr
P2 Rr X Rr = F2 = 25% RR, 50% Rr, and 25% rr.
GR: 1:2:1, PR: 1:2:1 (blending effect Rr)
CODOMINANCE: MULTIPLE ALLES

- ABO BLOOD GROUPS
- SURFACE ANTIGENS
- TYPE A = IAIA, IAi
- TYPE B = IBIB, Ibi
- TYPE AB = IAiB
- TYPE 0 = ii
- problems: TYPE A X TYPE B = ?

Figure 14.10 Multiple alleles for the ABO blood groups

<table>
<thead>
<tr>
<th>Phenotype (blood group)</th>
<th>Genotypes (see p.536)</th>
<th>Antibodies present in blood serum</th>
<th>Results from adding red blood cells from groups below to serum from groups at left</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>p1 p1</td>
<td>Anti-B</td>
<td>A, B, AB, O</td>
</tr>
<tr>
<td>B</td>
<td>p2 p2</td>
<td>Anti-A</td>
<td>-</td>
</tr>
<tr>
<td>AB</td>
<td>p1 p2</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>O</td>
<td>i i</td>
<td>Anti-A, Anti-B</td>
<td>-</td>
</tr>
</tbody>
</table>

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Figure 14.10x ABO blood types
MULTIPLE EFFECTS OF SINGLE GENES

- EPISTASIS:
  - EXPRESSION IN PIGMENT PRODUCTION/COAT COLOR IN ANIMALS
  - SHARPEI DOGS/ MELANIN PROD.
  - WHITE, CREAM, BLACK, AUBURN
  - SS, Ss, ss mixed expression. Other gene?

Figure 14.11 An example of epistasis

MULTIPLE EFFECTS OF SINGLE GENES

- PENETRANCE: ALL OR NONE
- MODE OF EXPRESSIVITY
- PP, Pp = PURPLE, pp = WHITE
- CONTINUOUS VARIATION:
- HEIGHT, SKIN COLOR, BODY BUILD
- RANGE OF PHENOTYPES
Multiple Effects of Single Genes

- **Gene Expression:** environment
  - RABBITS/NORTH/WHITE
  - RABBITS/SOUTH/DARKER
  - TEMPERATURE RELATED
  - AQUATIC PLANTS: CHANGE LEAF MORPHOLOGY WITH CO2 CHANGES.
MULTIPLE EFFECTS OF SINGLE GENES

PLEIOTROPY
SINGLE GENE EXERTS EFFECTS ON UNRELATED PHENOTYPE.
SICKLE CELL DISEASE
Hb HEMOGLOBIN, RBC SHAPE
HbAHbA = normal Hb
HbSHbS = sickle cell
HbA HbS = carrier/ Malaria
Figure 14.16 Large families provide excellent case studies of human genetics.

Figure 14.17 Testing a fetus for genetic disorders.