Chapter 14

Mendel and the Gene Idea

PowerPoint® Lecture Presentations for

Biology

Eighth Edition

Neil Campbell and Jane Reece

Lectures by Chris Romero, updated by Erin Barley with contributions from Joan Sharp

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Overview: Drawing from the Deck of Genes

• What genetic principles account for the passing of traits from parents to offspring?

• The “blending” hypothesis is the idea that genetic material from the two parents blends together (like blue and yellow paint blend to make green)

• The “particulate” hypothesis is the idea that parents pass on discrete heritable units (genes)

• Mendel discovered the basic principles of heredity by breeding garden peas in carefully planned experiments
Mendel’s Experimental, Quantitative Approach

- **Advantages of pea plants** for genetic study:
  - There are many varieties with distinct heritable features, or characters (such as flower color); character variants (such as purple or white flowers) are called traits
  - Mating of plants can be controlled
  - Each pea plant has sperm-producing organs (stamens) and egg-producing organs (carpels)
  - Cross-pollination (fertilization between different plants) can be achieved by dusting one plant with pollen from another
**Figure 14.2**

**TECHNIQUE**

1. Parental generation (P)
2. Stamens
3. Carpel
4. First filial generation offspring ($F_1$)

**RESULTS**

1. Parental generation (P)
2. Stamens
3. Carpel
4. First filial generation offspring ($F_1$)
Mendel chose to track only those characters that varied in an either-or manner.

He also used varieties that were true-breeding (plants that produce offspring of the same variety when they self-pollinate).
In a typical experiment, Mendel mated two **contrasting, true-breeding varieties**, a process called **hybridization**

- The true-breeding parents are the **P generation**
- The hybrid offspring of the P generation are called the **F₁ generation**
- When F₁ individuals self-pollinate, the **F₂ generation** is produced
**EXPERIMENT**

**The Law of Segregation**

P Generation (true-breeding parents)

F1 Generation (hybrids)

F2 Generation

- 705 purple-flowered plants
- 224 white-flowered plants

Purple flowers \( \times \) White flowers

All plants had purple flowers

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Mendel called the purple flower color a dominant trait and the white flower color a recessive trait.

Mendel observed the same pattern of inheritance in six other pea plant characters, each represented by two traits.

What Mendel called a “heritable factor” is what we now call a gene.
<table>
<thead>
<tr>
<th>Character</th>
<th>Dominant Trait</th>
<th>Recessive Trait</th>
<th>$F_2$ Generation</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flower color</td>
<td>Purple</td>
<td>White</td>
<td>705:224</td>
<td>3.15:1</td>
</tr>
<tr>
<td>Flower position</td>
<td>Axial</td>
<td>Terminal</td>
<td>651:207</td>
<td>3.14:1</td>
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<tr>
<td>Seed color</td>
<td>Yellow</td>
<td>Green</td>
<td>6,022:2,001</td>
<td>3.01:1</td>
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<tr>
<td>Seed shape</td>
<td>Round</td>
<td>Wrinkled</td>
<td>5,474:1,850</td>
<td>2.96:1</td>
</tr>
<tr>
<td>Pod shape</td>
<td>Inflated</td>
<td>Constricted</td>
<td>882:299</td>
<td>2.95:1</td>
</tr>
<tr>
<td>Pod color</td>
<td>Green</td>
<td>Yellow</td>
<td>428:152</td>
<td>2.82:1</td>
</tr>
<tr>
<td>Stem length</td>
<td>Tall</td>
<td>Dwarf</td>
<td>787:277</td>
<td>2.84:1</td>
</tr>
</tbody>
</table>
Mendel’s Model

• Mendel developed a **hypothesis to explain the 3:1 inheritance pattern** he observed in $F_2$ offspring

• **Four related concepts** make up this model

• These concepts can be related to what we now know about genes and chromosomes
• The first concept is that alternative versions of genes account for variations in inherited characters

• For example, the gene for flower color in pea plants exists in two versions, one for purple flowers and the other for white flowers

• These alternative versions of a gene are now called alleles

• Each gene resides at a specific locus on a specific chromosome
Alleles, alternative versions of a gene

- Allele for purple flowers
- Locus for flower-color gene
- Allele for white flowers
- Homologous pair of chromosomes
• The **second concept** is that for **each character an organism inherits two alleles, one from each parent**

• Mendel made this **deduction** without knowing about the role of chromosomes

• The two alleles at a locus on a chromosome may be **identical**, as in the true-breeding plants of Mendel’s P generation

• Alternatively, the two alleles at a locus may **differ**, as in the F₁ hybrids
• The **third concept** is that if the two alleles at a locus differ, then one (the **dominant allele**) **determines the organism’s appearance**, and the other (the **recessive allele**) **has no noticeable effect on appearance**

• In the flower-color example, the F₁ plants had purple flowers because the allele for that trait is **dominant**
• The **fourth concept**, now known as the **law of segregation**, states that the **two alleles for a heritable character separate (segregate) during gamete formation and end up in different gametes**

• Thus, an egg or a sperm gets **only one of the two alleles** that are present in the somatic cells of an organism

• This segregation of alleles corresponds to the distribution of homologous chromosomes to different gametes in meiosis
Mendel’s segregation model accounts for the 3:1 ratio he observed in the F2 generation of his numerous crosses.

The possible combinations of sperm and egg can be shown using a **Punnett square**, a diagram for predicting the results of a genetic cross between individuals of known genetic makeup.

A capital letter represents a dominant allele, and a lowercase letter represents a recessive allele.
P Generation

Appearance: Purple flowers White flowers
Genetic makeup: $PP$ $pp$

Gametes: $P$ $p$

F₁ Generation

Appearance: Purple flowers
Genetic makeup: $Pp$

Gametes: $1/2 P$ $1/2 p$

F₂ Generation

Sperm $P$ $p$
Eggs $PP$ $Pp$ $Pp$ $pp$

3:1 ratio
Useful Genetic Vocabulary

• An organism with two **identical alleles** for a character is said to be **homozygous** for the gene controlling that character.

• An organism that has two **different alleles** for a gene is said to be **heterozygous** for the gene controlling that character.

• Unlike homozygotes, **heterozygotes are not true-breeding**.
Because of the different effects of dominant and recessive alleles, an **organism’s traits do not always reveal its genetic composition**.

Therefore, we distinguish between an organism’s **phenotype**, or physical appearance, and its **genotype**, or genetic makeup.

In the example of flower color in pea plants, \( PP \) and \( Pp \) plants have the **same phenotype (purple)** but **different genotypes**.
Phenotype

Purple
Purple
Purple

Genotype

$PP$ (homozygous)
$Pp$ (heterozygous)
$Pp$ (heterozygous)
$pp$ (homozygous)

Ratio 3:1
Ratio 1:2:1
The Testcross

- How can we tell the genotype of an individual with the dominant phenotype?
- Such an individual must have one dominant allele, but the individual could be either homozygous dominant or heterozygous.
- The answer is to carry out a testcross: breeding the mystery individual with a homozygous recessive individual.
- If any offspring display the recessive phenotype, the mystery parent must be heterozygous.
The testcross

**TECHNIQUE**

**Dominant phenotype, unknown genotype:**
- PP or Pp?

**Recessive phenotype, known genotype:**
- pp

**Predictions**

- If PP Sperm
  - Pp
  - Pp
- or

  - P

- If Pp Sperm
  - Pp
  - pp

**RESULTS**

- All offspring purple
- or

  - $\frac{1}{2}$ offspring purple and $\frac{1}{2}$ offspring white
The Law of Independent Assortment

- Mendel derived *the law of segregation* by following a single character.

- The $F_1$ offspring produced in this cross were **monohybrids**, individuals that are **heterozygous** for one character.

- A cross between such heterozygotes is called a **monohybrid cross**.
• Mendel identified his second law of inheritance by following two characters at the same time

• Crossing two true-breeding parents differing in two characters produces **dihybrids** in the F\textsubscript{1} generation, **heterozygous for both characters**

• A dihybrid cross, a cross between F\textsubscript{1} dihybrids, can determine whether two characters are transmitted to offspring as **a package** or **independently**
EXPERIMENT

P Generation

- YYRR
- yyrr

Gametes

YR
yr

F1 Generation

YyRr

Predictions

Hypothesis of dependent assortment

Predicted offspring of F2 generation

Sperm

1/4 YR 1/4 Yr 1/4 yR 1/4 yr

Eggs

1/2 YR 1/2 yr

3/4 YyRr 1/4 yyrr

Phenotypic ratio 3:1

RESULTS

315 108 101 32

Phenotypic ratio approximately 9:3:3:1

Phenotypic ratio 9:3:3:1

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• Using a dihybrid cross, Mendel developed the **law of independent assortment**

• The law of independent assortment states that each pair of alleles segregates independently of each other pair of alleles during gamete formation

• Genes located near each other on the same chromosome tend to be inherited together
The laws of probability govern Mendelian inheritance

- Mendel’s laws of segregation and independent assortment reflect the **rules of probability**
- When tossing a coin, the **outcome of one toss has no impact on the outcome of the next toss**
- In the same way, **the alleles of one gene segregate into gametes independently of another gene’s alleles**
The Multiplication and Addition Rules Applied to Monohybrid Crosses

• The multiplication rule states that the probability that two or more independent events will occur together is the product of their individual probabilities.

• Probability in an $F_1$ monohybrid cross can be determined using the multiplication rule.

• Segregation in a heterozygous plant is like flipping a coin: Each gamete has a $\frac{1}{2}$ chance of carrying the dominant allele and a $\frac{1}{2}$ chance of carrying the recessive allele.
Segregation of alleles into eggs

Segregation of alleles into sperm

Segregation of alleles and fertilization as chance events
• The **rule of addition** states that the probability that any one of two or more exclusive events will occur is calculated **by adding together their individual probabilities**

• The rule of addition can be used to figure out the probability that an F₂ plant from a monohybrid cross will be heterozygous rather than homozygous
Inheritance patterns are often more complex than predicted by simple Mendelian genetics

- The relationship between genotype and phenotype is rarely as simple as in the pea plant characters Mendel studied.
- Many heritable characters are not determined by only one gene with two alleles.
- However, the basic principles of segregation and independent assortment apply even to more complex patterns of inheritance.
Extending Mendelian Genetics for a Single Gene

- Inheritance of characters by a single gene may *deviate* from simple Mendelian *patterns* in the following situations:
  - When alleles are *not completely dominant* or *recessive*
  - When a gene has *more than two alleles*
  - When a gene produces *multiple phenotypes*
Degrees of Dominance

- **Complete dominance** occurs when phenotypes of the heterozygote and dominant homozygote are identical.

- In **incomplete dominance**, the phenotype of $F_1$ hybrids is somewhere between the phenotypes of the two parental varieties.

- In **codominance**, two dominant alleles affect the phenotype in separate, distinguishable ways.
**P Generation**

- Red: $C^R C^R$
- White: $C^W C^W$

**Gametes**

- $C^R$
- $C^W$

**F$_1$ Generation**

- Pink: $C^R C^W$

**Gametes**

- $\frac{1}{2} C^R$
- $\frac{1}{2} C^W$

**F$_2$ Generation**

- Eggs:
  - $\frac{1}{2} C^R$
  - $\frac{1}{2} C^W$

- Sperm:
  - $\frac{1}{2} C^R$
  - $\frac{1}{2} C^W$

- genotypes:
  - $C^R C^R$
  - $C^R C^W$
  - $C^R C^W$
  - $C^W C^W$

**Incomplete dominance in snapdragon color**
Frequency of Dominant Alleles

• Dominant alleles are not necessarily more common in populations than recessive alleles

• For example, one baby out of 400 in the United States is born with extra fingers or toes

• The allele for this unusual trait is dominant to the allele for the more common trait of five digits per appendage

• In this example, the recessive allele is far more prevalent than the population’s dominant allele
Multiple Alleles

• **Most genes exist in populations in more than two allelic forms**

• For example, the four phenotypes of the ABO blood group in humans are determined by three alleles for the enzyme (I) that attaches A or B carbohydrates to red blood cells: \( I^A \), \( I^B \), and \( i \).

• The enzyme encoded by the \( I^A \) allele adds the A carbohydrate, whereas the enzyme encoded by the \( I^B \) allele adds the B carbohydrate; the enzyme encoded by the \( i \) allele adds neither
(a) The three alleles for the ABO blood groups and their associated carbohydrates

<table>
<thead>
<tr>
<th>Allele</th>
<th>Carbohydrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>$I^A$</td>
<td>A △</td>
</tr>
<tr>
<td>$I^B$</td>
<td>B ●</td>
</tr>
<tr>
<td>$i$</td>
<td>none</td>
</tr>
</tbody>
</table>

(b) Blood group genotypes and phenotypes

<table>
<thead>
<tr>
<th>Genotype</th>
<th>Red blood cell appearance</th>
<th>Phenotype (blood group)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$I^A I^A$ or $I^A i$</td>
<td><img src="image" alt="A blood cell" /></td>
<td>A</td>
</tr>
<tr>
<td>$I^B I^B$ or $I^B i$</td>
<td><img src="image" alt="B blood cell" /></td>
<td>B</td>
</tr>
<tr>
<td>$I^A I^B$</td>
<td><img src="image" alt="AB blood cell" /></td>
<td>AB</td>
</tr>
<tr>
<td>$ii$</td>
<td><img src="image" alt="O blood cell" /></td>
<td>O</td>
</tr>
</tbody>
</table>

Multiple alleles for the ABO blood groups
Multiple Alleles

Dark gray
$CC, Cc^{ch}, Cc^{h}, \text{ or } C^c$

Chinchilla
$c^{ch}c^{ch}, c^{ch}c^{h}, \text{ or } c^{ch}c$

Himalayan
$c^{h}c^{h} \text{ or } c^{h}c$

Albino
$cc$
Pleiotropy

- Most genes have **multiple phenotypic effects**, a property called **pleiotropy**

- For example, pleiotropic alleles are responsible for the **multiple symptoms** of certain hereditary diseases, such as **cystic fibrosis** and **sickle-cell disease**
Sickle-cell disease, multiple effects of a single human gene

Individual homozygous for sickle-cell allele

Sickle-cell (abnormal) hemoglobin

Abnormal hemoglobin crystallizes, causing red blood cells to become sickle-shaped

Sickle cells

Breakdown of red blood cells

Physical weakness

Anemia

Heart failure

Pain and fever

Brain damage

Damage to other organs

Spleen damage

Accumulation of sickled cells in spleen

Clumping of cells and clogging of small blood vessels

Impaired mental function

Paralysis

Pneumonia and other infections

Rheumatism

Kidney failure
Extending Mendelian Genetics for Two or More Genes

- Some traits may be determined by two or more genes
- In epistasis, a gene at one locus alters the phenotypic expression of a gene at a second locus
- For example, in mice and many other mammals, coat color depends on two genes
- One gene determines the pigment color (with alleles $B$ for black and $b$ for brown)
- The other gene (with alleles $C$ for color and $c$ for no color) determines whether the pigment will be deposited in the hair
Epistasis

Black
BBEE, BbEE, BBEe or BbEe

Yellow
BBee, Bbee or bbee

Chocolate
bbEE or bbEe

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### An example of epistasis

#### Sperm
- $\frac{1}{4} BC$
- $\frac{1}{4} bC$
- $\frac{1}{4} Bc$
- $\frac{1}{4} bc$

#### Eggs
<table>
<thead>
<tr>
<th>$\frac{1}{4} BC$</th>
<th>$\frac{1}{4} bC$</th>
<th>$\frac{1}{4} Bc$</th>
<th>$\frac{1}{4} bc$</th>
</tr>
</thead>
<tbody>
<tr>
<td>BBCC</td>
<td>BbCC</td>
<td>BBCc</td>
<td>BbCc</td>
</tr>
<tr>
<td>BbCC</td>
<td>bbCC</td>
<td>BbCc</td>
<td>bbCc</td>
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<td>BBCc</td>
<td>BbCc</td>
<td>BBcc</td>
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</tr>
<tr>
<td>Bbcc</td>
<td>bbCc</td>
<td>Bbcc</td>
<td>bbcc</td>
</tr>
</tbody>
</table>

#### Ratios
- 9:3:4
Polygenic Inheritance

- **Quantitative characters** are those that vary in the population along a continuum.

- Quantitative variation usually indicates **polygenic inheritance**, an additive effect of two or more genes on a single phenotype.

- Skin color in humans is an example of polygenic inheritance.
A simplified model for polygenic inheritance of skin color

Phenotypes:

Number of dark-skin alleles: 0 1 2 3 4 5 6
Nature and Nurture: The Environmental Impact on Phenotype

• Another departure from Mendelian genetics arises when the phenotype for a character depends on environment as well as genotype.

• The **norm of reaction** is the **phenotypic range of a genotype** influenced by the **environment**.

• For example, hydrangea flowers of the same genotype range from blue-violet to pink, depending on soil acidity.
Varying phenotypes due to environmental factors in genetically identical twins
Influence of the Environment on Hydrangea Flower Color
Integrating a Mendelian View of Heredity and Variation

• An organism’s **phenotype** includes its **physical appearance, internal anatomy, physiology, and behavior**

• An organism’s **phenotype** reflects:
  
  • **its overall genotype** and
  
  • **unique environmental history**
Many human traits follow Mendelian patterns of inheritance

• Humans are not good subjects for genetic research
  – Generation time is too long
  – Parents produce relatively few offspring
  – Breeding experiments are unacceptable

• However, basic Mendelian genetics endures as the foundation of human genetics
A **pedigree** is a family tree that describes the interrelationships of parents and children across generations.

Inheritance patterns of particular traits can be traced and described using pedigrees.

### Pedigree Analysis

**Key**
- □ Male
- ☐ Female
- □ Affected male
- ☐ Affected female

**Mating**
- Offspring, in birth order (first-born on left)

1st generation (grandparents)

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ww</td>
<td>wW</td>
<td>Ww</td>
<td>wW</td>
<td>Ww</td>
<td>Ww</td>
</tr>
</tbody>
</table>

2nd generation (parents, aunts, and uncles)

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
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<td>wW</td>
<td>Ww</td>
<td>wW</td>
<td>Ww</td>
<td>wW</td>
</tr>
</tbody>
</table>

3rd generation (two sisters)

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>WW or Ww</td>
<td>WW or Ww</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Widow’s peak**
- **No widow’s peak**

(a) Is a widow’s peak a dominant or recessive trait?

1st generation (grandparents)

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ff</td>
<td>fF</td>
<td>Ff</td>
<td>fF</td>
</tr>
</tbody>
</table>

2nd generation (parents, aunts, and uncles)

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF or Ff</td>
<td>ff</td>
<td>Ff</td>
<td>Ff</td>
<td>ff</td>
<td></td>
</tr>
</tbody>
</table>

3rd generation (two sisters)

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>ff</td>
<td>FF or Ff</td>
<td>ff</td>
<td>FF or Ff</td>
</tr>
</tbody>
</table>

- **Attached earlobe**
- **Free earlobe**

(b) Is an attached earlobe a dominant or recessive trait?
Recessively Inherited Disorders

• Pedigrees can also be used to make predictions about future offspring

• We can use the multiplication and addition rules to predict the probability of specific phenotypes

• Many genetic disorders are inherited in a recessive manner
The Behavior of Recessive Alleles

• **Recessively inherited disorders** show up **only** in individuals **homozygous** for the allele

• **Carriers** are heterozygous individuals who carry the recessive allele but are **phenotypically normal** (i.e., pigmented)

• Albinism is a recessive condition characterized by a lack of pigmentation in skin and hair
Albinism: a recessive trait

Parents

Normal
Aa
×
Normal
Aa

Sperm

A

a

Eggs

A

AA Normal
Aa Normal (carrier)

Aa Normal (carrier)

aa Albino

Albinism: a recessive trait
Hemophilia in the royal family of Russia (half-filled symbols represent heterozygous carriers)
• If a recessive allele that causes a disease is rare, then the chance of two carriers meeting and mating is low

• Consanguineous matings (i.e., matings between close relatives) increase the chance of mating between two carriers of the same rare allele

• Most societies and cultures have laws or taboos against marriages between close relatives
Cystic Fibrosis

- **Cystic fibrosis** is the most common lethal genetic disease in the United States, striking one out of every 2,500 people of European descent.

- The cystic fibrosis allele results in defective or absent chloride transport channels in plasma membranes.

- Symptoms include mucus buildup in some internal organs and abnormal absorption of nutrients in the small intestine.
Sickle-Cell Disease

- **Sickle-cell disease** affects one out of 400 African-Americans
- The disease is caused by the substitution of a single amino acid in the hemoglobin protein in red blood cells
- **Symptoms** include physical weakness, pain, organ damage, and even paralysis
Dominantly Inherited Disorders

- Some human disorders are caused by **dominant alleles**
- Dominant alleles that cause a lethal disease are **rare** and arise by mutation
- *Achondroplasia* is a **form of dwarfism** caused by a **rare dominant allele**
Parents

Dwarf

Normal

Dd × dd

Sperm

D

d

Eggs

d

Dd Dwarf

dd Normal

Dd Dwarf

dd Normal
• Huntington’s disease is a degenerative disease of the nervous system

• The disease has no obvious phenotypic effects until the individual is about 35 to 40 years of age

• Genetic counselors can provide information to prospective parents concerned about a family history for a specific disease

• For a growing number of diseases, tests are available that identify carriers and help define the odds more accurately
Fetal Testing

- In **amniocentesis**, the **liquid that bathes the fetus** is removed and tested
- In **chorionic villus sampling (CVS)**, a sample of the **placenta** is removed and tested
- Other techniques, such as **ultrasound** and **fetoscopy**, allow fetal health to be assessed visually in utero
(a) Amniocentesis

Amniotic fluid withdrawn
Fetus
Placenta
Uterus
Cervix

Centrifugation

Fluid
Fetal cells

Several hours

Several weeks

Biochemical tests

Karyotyping

(b) Chorionic villus sampling (CVS)

Suction tube inserted through cervix

Placenta
Chorionic villi
Fetus

Suction tube inserted through cervix

Several hours

Several hours

Several hours

Fetal cells

Several weeks
<table>
<thead>
<tr>
<th>Degree of dominance</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete dominance of one allele</td>
<td>Heterozygous phenotype same as that of homozygous dominant</td>
<td><img src="image" alt="PP" /> <img src="image" alt="Pp" /></td>
</tr>
<tr>
<td>Incomplete dominance of either allele</td>
<td>Heterozygous phenotype intermediate between the two homozygous phenotypes</td>
<td><img src="image" alt="C^R C^R" /> <img src="image" alt="C^R C^W" /> <img src="image" alt="C^W C^W" /></td>
</tr>
<tr>
<td>Codominance</td>
<td>Heterozygotes: Both phenotypes expressed</td>
<td><img src="image" alt="I^A I^B" /></td>
</tr>
<tr>
<td>Multiple alleles</td>
<td>In the whole population, some genes have more than two alleles</td>
<td>ABO blood group alleles <img src="image" alt="I^A, I^B, i" /></td>
</tr>
<tr>
<td>Pleiotropy</td>
<td>One gene is able to affect multiple phenotypic characters</td>
<td>Sickle-cell disease</td>
</tr>
<tr>
<td>Relationship among genes</td>
<td>Description</td>
<td>Example</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td><strong>Epistasis</strong></td>
<td>One gene affects the expression of another</td>
<td><img src="image" alt="Epistasis Example" /></td>
</tr>
<tr>
<td><strong>Polygenic inheritance</strong></td>
<td>A single phenotypic character is affected by two or more genes</td>
<td><img src="image" alt="Polygenic Inheritance Example" /></td>
</tr>
</tbody>
</table>