

Applied Genetics



تم تحميل هذا الملف من موقع المناهج الإماراتية

موقع المناهج ← المناهج الإماراتية ← الصف الحادي عشر العام ← علوم ← الفصل الثالث ← ملفات متنوعة ← الملف

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المزيد من مادة
علوم:

التواصل الاجتماعي بحسب الصف الحادي عشر العام



صفحة المناهج
الإماراتية على
فيسبوك

الرياضيات

اللغة الانجليزية

اللغة العربية

التربية الاسلامية

المواد على تلغرام

المزيد من الملفات بحسب الصف الحادي عشر العام والمادة علوم في الفصل الثالث

Genetic Recombination and Gene Linkage

1

Practice for Mendelian Genetics

2

Mendelian Genetics

3

الأنماط الأساسية للوراثة البشرية

4

ارتباط الجينات وتعدد المجموعات الكروموسومية

5



selective breeding

You may already know different dog breeds like:

- Saint Bernards
- Huskies
- German shepherds

Observe their phenotypic traits in **Figure 13**.

All three have strong, muscular bodies.

Examples:

- Saint Bernards → Keen sense of smell → Good rescue dogs
- Huskies → High endurance → Pull sleds over long distances
- German shepherds → Highly trainable → Used in special services

Since ancient times, humans have bred animals with desired traits to obtain better or desired offspring.

These traits became more common over generations.

This concept is not limited to animals.

Plants are also selectively bred to:

- Produce larger fruits
- Grow in shorter time

Selective breeding: The process where specific traits are selected and passed on to offspring (future generation)

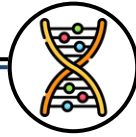
Through hybridization¹ and inbreeding², desired traits can be passed to future generations.



figure 13

Dogs have traits that make them suited for different tasks:

- Saint Bernard → keen sense of smell
- Husky → endurance to run long distances
- German shepherd → high trainability



hybridization

Crossing parent organisms with different forms of a trait to produce offspring with specific traits results in hybrids.

Farmers, animal breeders, scientists, and gardeners often use the production of hybrids, also known as **hybridization**.

They select traits that give hybrid organisms a competitive edge, such as:

- disease resistance
- or faster growth

For example, plant breeders might choose to cross two different varieties of tomato plants

→ to produce a hybrid that has both:

- the disease resistance of one parent
- and the fast growth rate of the other

advantages and disadvantages

Care must be taken to cross organisms to yield the right combination of traits from both parents.

A disadvantage of hybridization is that it is:

- time consuming
- expensive

Example:

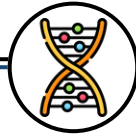
It took rice breeders three decades to produce hybrid rice varieties that yield more than nonhybrids.

why hybridization is still used

Because hybrids can be bred to be:

- more nutritious
- more adaptable (to have the ability to adapt to a wide range of change in the environment)
- and to produce greater numbers of offspring

the advantages of hybridization sometimes outweigh the disadvantages



inbreeding

Once a breeder observes a desired trait in an organism, a process is needed to ensure that the trait is passed on to future generations.

This process, in which two closely related organisms are bred to:

- maintain desired traits
- eliminate undesired ones in future generations is called **inbreeding**.

real-life examples

Pure breeds are maintained by inbreeding.

Examples include:

- Clydesdale horses
- Angus cattle
- German shepherd dogs

You may have seen **Clydesdale horses in parades or petting zoos**.

These horses were originally bred in **Scotland** “hundreds of years ago” for use as farm horses.

→ Because of their strong build, agility, and obedient nature, Clydesdales were widely used for pulling heavy loads.

disadvantage of inbreeding

One major disadvantage of inbreeding:

→ Harmful **recessive traits** can be passed to future generations.

Inbreeding increases the chance of producing:

- Homozygous recessive offspring

If both parents carry a **recessive allele** for a harmful trait,

That trait is likely to remain or will not eliminate in the population.

test cross

When producing a hybrid, breeders must determine the genotype of the hybrid.

This genotype is identified by performing a **test cross**.

A **test cross** involves breeding an organism with an unknown genotype with one that is homozygous recessive for the desired trait.

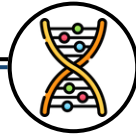
how it works

- If the parent is homozygous dominant,
All offspring will show the dominant phenotype

- If the parent is heterozygous,

The offspring will show a 1:1 phenotypic ratio
(i.e., half dominant, half recessive)





performing a test cross

Suppose a breeder wants to produce hybrid white grapefruits.

In grapefruit trees:

- White is the dominant trait
- Red is recessive

→ Therefore, red grapefruit trees must be homozygous recessive (ww)

The genotype of the hybrid white grapefruit tree can be:

- Homozygous dominant (WW)
- or Heterozygous (Ww)

The breeder uses a test cross to determine the genotype of the white grapefruit tree.

During the cross:

Pollen from one plant's flower is transferred to the female organ of another flower.

		Homozygous white grapefruit	
		W	W
Homozygous red grapefruit	w	Ww	Ww
	w	Ww	Ww

		Heterozygous white grapefruit	
		W	w
Homozygous red grapefruit	w	Ww	ww
	w	Ww	ww

figure 14

The genotype of a white grapefruit tree can be determined by a test cross.

explain:

How does a test cross show the relationship between genotype and phenotype?

A test cross shows how genotype affects phenotype by revealing if a dominant-looking organism is homozygous (all dominant offspring) or heterozygous (1:1 offspring ratio).



what figure 14 shows

If the white tree is WW and is crossed with a red tree (ww):

All offspring will be Ww (heterozygous)
All will be white (dominant phenotype)

If the white tree is Ww:

Half the offspring will be white (Ww)
Half will be red (ww)
The phenotypic ratio = 1:1