

Genetic Recombination and Gene Linkage



تم تحميل هذا الملف من موقع المناهج الإماراتية

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

تاريخ إضافة الملف على موقع المناهج: 2026-07-01 23:38:44

ملفات اكتب للمعلم اكتب للطالب | اختبارات الكترونية | اختبارات | حلول | عروض بوربوينت | أوراق عمل
منهج انجليزي | ملخصات وتقارير | مذكرات وبنوك | الامتحان النهائي | للمدرس

المزيد من مادة
علوم:

إعداد: Sailux

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

Practice for Mendelian Genetics

1

Mendelian Genetics

2

الأنماط الأساسية للوراثة البشرية

3

ارتباط الجينات وتعدد المجموعات الكروموسومية

4

علم الوراثة المنديلية

5



Genetic Recombination

The combination of genes produced by crossing over and independent assortment is called genetic recombination.

- The number of possible gene combinations from independent assortment can be calculated using:
→ 2^n , where n = number of chromosome pairs

Example:

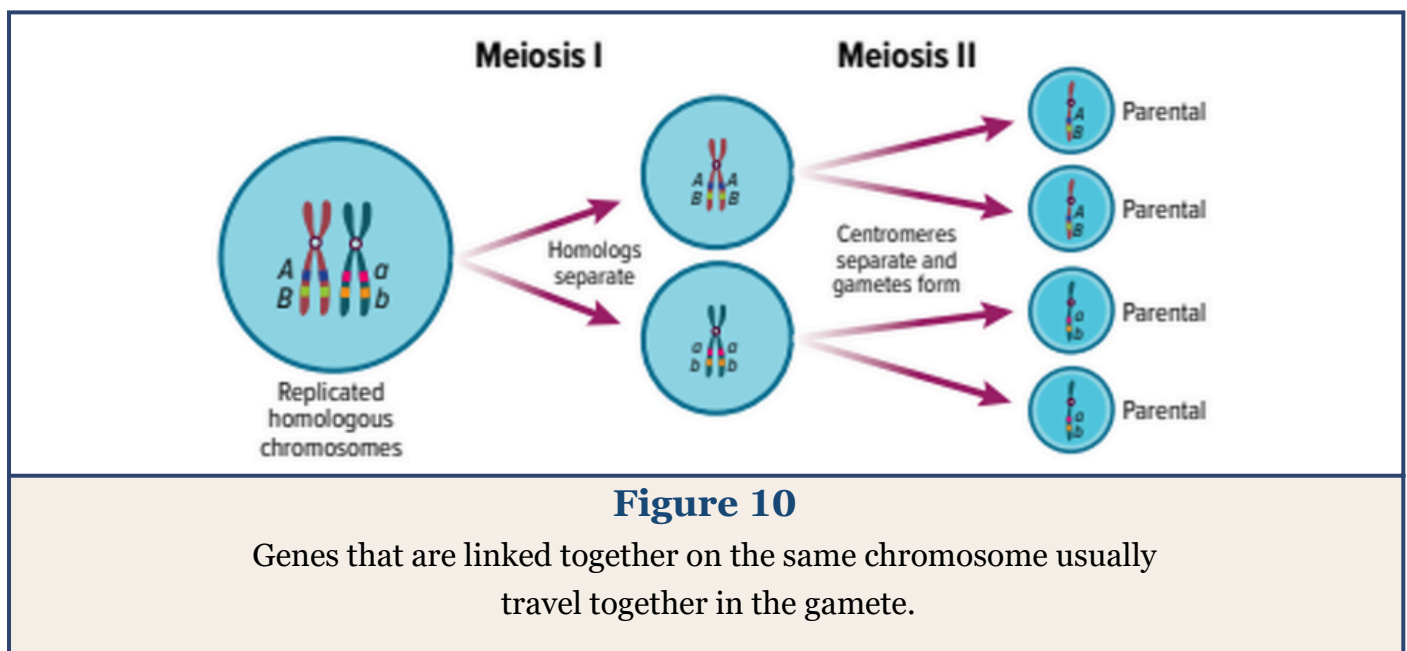
- Pea plants have 7 pairs of chromosomes
→ So: $2^7 = 128$ combinations
- Since any male gamete can combine with any female gamete:
→ Total combinations after fertilization = $128 \times 128 = 16,384$

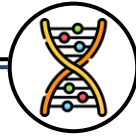
Conclusion:

Genetic recombination increases genetic variation.

Gene linkage

- Chromosomes contain multiple genes that code for proteins.
- Genes located close together on the same chromosome are called linked.
- Linked genes usually travel together during gamete formation.
→ Closely related genes (like A and B) are discussed in **Figure 10**.





linked genes and crossing over

Linked genes usually travel together during meiosis.

However, experiments using the fruit fly *Drosophila melanogaster* showed that:

- Linked genes do not always travel together during meiosis
- Scientists concluded that linked genes can separate during crossing over

how crossing over affects gene linkage

During sexual reproduction, chromosomes can swap sections during meiosis:

This creates new genetic combinations

Which increases genetic variation

exception to mendel's law

Linked genes on the same chromosome usually do not segregate independently

This causes an exception to Mendel's law of independent assortment

chromosome maps

Crossing over occurs more frequently between genes that are far apart than between genes that are close together.

A chromosome map:

- Shows the sequence of genes on a chromosome
- Can be built using crossover data

The first chromosome maps were published in 1913, using data from thousands of fruit fly crosses.

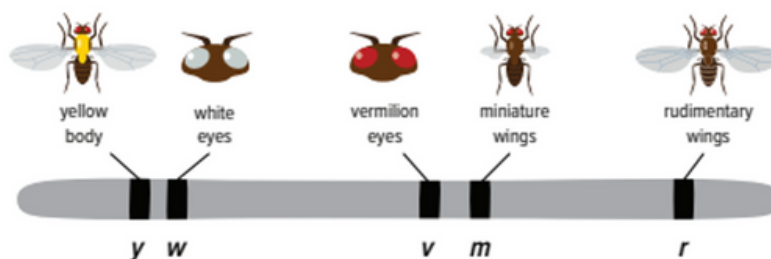


figure 11

This chromosome map of the X chromosome of the fruit fly *Drosophila melanogaster* was created in 1913.



figure 11

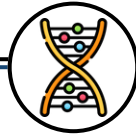
Figure 11 shows the first chromosome map created using fruit fly data.

Key concept:

- The higher the crossover frequency, the farther apart the two genes are
- Genes that are closer together have a lower frequency of crossing over

In the example:

- Genes for yellow body and white eyes are close together on the map
Because they show a low crossover frequency



polyploidy

Most species have **diploid cells**, but some have polyploid cells.

Polyplody is the occurrence of one or more extra sets of all chromosomes in an organism.

Example:

A triploid organism would be labeled $3n$, meaning it has three complete sets of chromosomes.

Polyplody is rare in animals

In humans, it is always lethal

polyplody in plants

- About **1 in 3 species** of known flowering plants are **polyplody**
- Polyplody plants are often selected by growers for desirable traits like larger flowers

Examples of common polyplody crops:

- Bread wheat ($6n$)
- Oats ($6n$)
- Sugar cane ($8n$)
- Strawberries ($8n$)

Polyplody plants (like the one that produced the coffee in **Figure 12**) often show:

- Increased vigor
- Larger size



figure 12

Various commercial plants, such as coffee, are polyploids.