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## ملخص وشرح الدرس الثاني Recombination Genetic الجينات المترابطة والخرائط الكروموسومية

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تاريخ إضافة الملف على موقع المناهج: 2024-09-24 13:16:38

إعداد: أحمد الحداد

## التواصل الاجتماعي بحسب الصف الثاني عشر المتقدم



[اضغط هنا للحصول على جميع روابط "الصف الثاني عشر المتقدم"](#)

## روابط مواد الصف الثاني عشر المتقدم على تلغرام

[الرياضيات](#)

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## المزيد من الملفات بحسب الصف الثاني عشر المتقدم والمادة علوم في الفصل الأول

[شرح درس Inheritance Of Patterns Complex الأنماط الوراثة المعقدة الجزء الأول](#)

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## المزيد من الملفات بحسب الصف الثاني عشر المتقدم والمادة علوم في الفصل الأول

[كتاب الطالب الوحدة الأولى علم الوراثة والتقنيات الحيوية](#)

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[امتحان نهاية الفصل الأول 2017](#)

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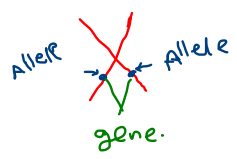
11-9-2024



# L2: Genetic Recombination and Gene Linkage

How do genetic recombination and gene linkage compare?

الجينات المترابطة والجينات المستقلة



20 Amino acids  
produce  
10,000 proteins  
structures for tissues and organs.

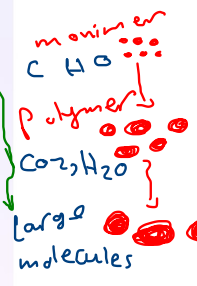
الترابك الجينية

**01 Genetic Recombination**  
The new combination of genes produced by crossing over and independent assortment

**02 Protein**  
Large, complex polymer essential to all life that provides structure for tissues and organs.

**03 Polyploidy**  
The occurrence of one or more extra sets of chromosomes in an organism

**04 Crossing Over**  
The exchange of genetic material between homologous chromosomes during meiosis.



carbohydrate (sugar).  
protein → build tissue and organs.  
lipids → (oil)  
nucleic acids → DNA, RNA

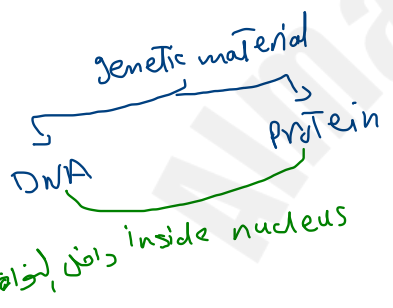
$23 = n$   
 $46 = 2n$

## Genetic Recombination



- The new combination of genes produced by crossing over and the independent assortment is called genetic recombination.
- Combinations of genes due to independent assortment can be calculated using the formula  $2^n$ , where  $n$  is the number of chromosome pairs.
- Any possible male gamete can fertilize any possible female gamete, so the possible combinations after fertilization are  $2n \times 2n$ .
  - Example  $223 \times 223 = 70,400,000,000,000$

$2^n \times 2^n$   
 $2^{23} \times 2^{23}$

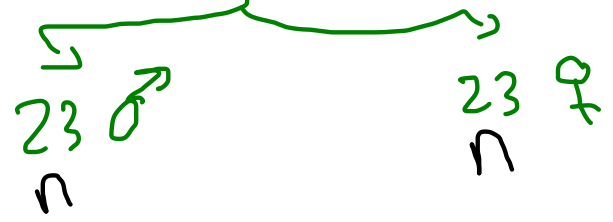


2025

2024

موقع المناهج الإلكترونية

$2n$   
46 chromosomes.



مجموعة كروموسومات

Humans

$$n = 23$$

$$2n = 46$$

$$3n = 46 + 1$$

donkey

60 chromosomes



Cells in our body

الجسمية Body cells

الجنسية sexual cells

الانقسام المتساوي mitosis

البويضة وovum ♀ sperm ♂ الحيوان المنوي الأختلاق

Gametes

الانقسام متساوي meiosis

- cell division.
- occur in body cells.
- each cell divided into 2 daughter cell.
- each cell has the same number of chromosomes as mother cell.
- Skin cells, Bone cells, Blood cells.

develop into Sperm

develop into egg.

- only in sex cells.

- each cell divided into:-

4 daughter cell. develop into 4 sperm.

1 egg cell and 1 polar body.



# Gene Linkage

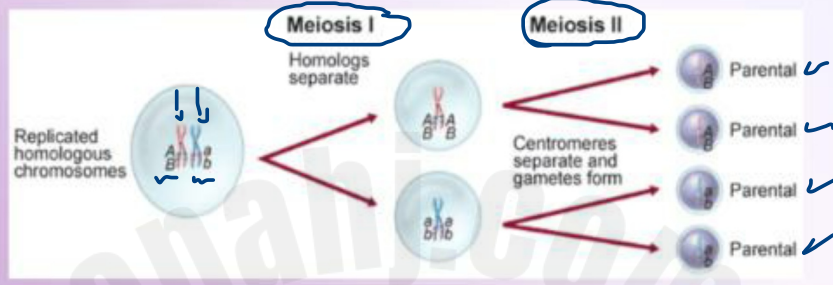
Genes located close to each other on the same chromosome are said to be linked.

They usually travel together during gamete formation.

Gene linkage results in an exception to Mendel's law of independent assortment.

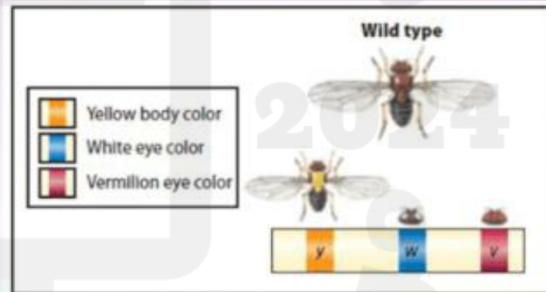
While studying linked genes, scientists found that linked genes sometimes do not travel together.

Conclusion linked genes can be separated during crossing over



# Chromosome Maps

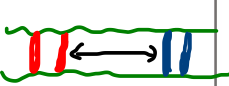
- Crossing over occurs more frequently between genes that are farther apart.
- Cross-over data can be used to create chromosome maps, depictions of how genes are arranged on a chromosome
- The first chromosome maps were published in 1913 using data from thousands of fruit fly crosses
- On a chromosome map, the frequency of how often crossing over happens between genes is correlated to how far apart they are on the map
- One map unit between two genes is equivalent to 1% of the crossing over occurring between genes
- Genes that are farther apart would have a greater frequency of crossing over



X

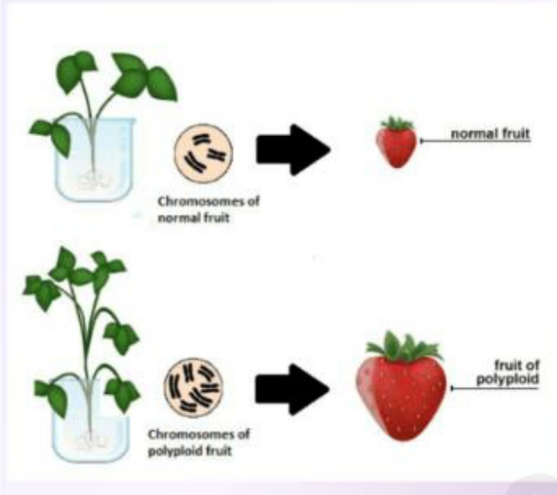
الخريطة الجينية

importance of chromosomes maps





# Polyploidy



- Polyploidy is the occurrence of one or more extra sets of all chromosomes in an organism.
- A triploid organism is designated  $3n$  which means that it has three complete sets of chromosomes.
- In humans polyploidy is lethal
- Many agricultural crops are polyploid.
- Wheat ( $6n$ ), oats ( $6n$ ), and sugar cane ( $8n$ )
- Polyploid plants often have increased vigor and size

$n =$   
 $2n =$   
 $3n$

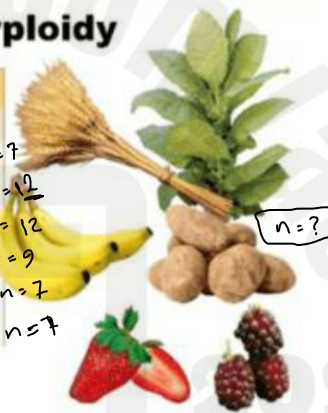
strawberry  $8n$

coffee  $8n$

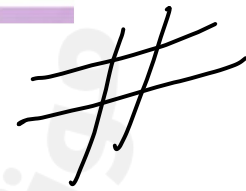
Diploid =  $2n$  ( $n$  = number of chromosomes)  
 Human cell =  $23(2) = 46$   $2n$   
 Somatic or body cells =  $46$   $2n$   
 Haploid =  $n$   
 Human cell =  $23$   
 Sperm or egg = gametes

## Polyploidy

Name	Number
Common wheat	$6N = 42$ $n=7$
Tobacco	$4N = 48$ $n=12$
Potato	$4N = 48$ $n=12$
Banana	$3N = 27$ $n=9$
Boysenberry	$7N = 49$ $n=7$
Strawberry	$8N = 56$ $n=7$



Many ferns are polyploid with chromosome number up to  $400N$



\*\*\*\*\*

	W	W
w	Ww	Ww
w	Ww	Ww







4. What is genetic recombination?

- a) The combination of genes produced by crossing over and independent assortment.
- b) The occurrence of one or more extra sets of chromosomes.
- c) A map that shows the sequence of genes on a chromosome.
- d) When genes located close to each other on the same chromosome tend to travel together during meiosis.

5. Why is genetic recombination a good thing?

- a) Gives us new genes
- b) separates during crossing over
- c) is lethal in humans
- d) increases genetic variation

7. What is gene linkage?

- a) The combination of genes produced by crossing over and independent assortment.
- b) When genes located close to each other on the same chromosome tend to travel together during meiosis.
- c) A map that shows the sequence of genes on a chromosome.
- d) The occurrence of one or more extra sets of chromosomes.

9. What is a chromosome map?

- a) The combination of genes produced by crossing over and independent assortment.
- b) A map that shows the sequence of genes on a chromosome.
- c) The occurrence of one or more extra sets of chromosomes.
- d) When genes located close to each other on the same chromosome tend to travel together during meiosis.

12. What is polyploidy?

- a) The occurrence of one or more extra sets of chromosomes.
- b) The combination of genes produced by crossing over and independent assortment.
- c) A map that shows the sequence of genes on a chromosome.
- d) When genes located close to each other on the same chromosome tend to travel together during meiosis.

4. What is a Test Cross?

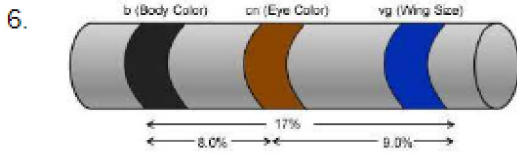
- a) Breeding 2 closely related organisms.
- b) A process of selecting desired traits to be passed on to offspring.
- c) breeding an organism with a known genotype with an unknown genotype and using the offspring to determine the unknown.
- d) Breeding organisms to create hybrids.



5. Why is genetic recombination a good thing?

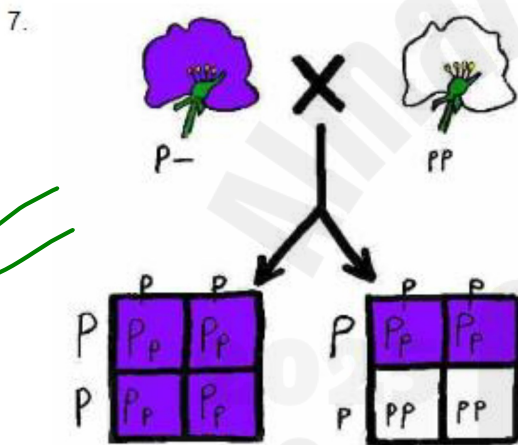
- a) Gives us new genes
- b) is lethal in humans
- c) separates during crossing over
- d) increases genetic variation

التنوع الوراثي



What is this an example of?

- a) Chromosome tree
- b) Chromosome map
- c) Different alleles
- d) Gene linkage



الانقسام المتساوي  
mitosis  
↓  
Body cells.

الانقسام المنصف  
meiosis  
↓  
sex cells.

This is an example of what?

- a) Gene Linkage
- b) Test Cross
- c) Inbreeding
- d) Chromosome Map

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8. What is gene linkage?

- a) The combination of genes produced by crossing over and independent assortment.
- b) A map that shows the sequence of genes on a chromosome.
- c) When genes located close to each other on the same chromosome tend to travel together during meiosis.
- d) The occurrence of one or more extra sets of chromosomes. \*\*\*