



# ***Genetics***

***Subject** : Genetics*

***Lec no** : 2 (record 2 part 1*

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وَقُلْ رَبِّ زِدْنِي عِلْمًا

تُجدون في guidance مادة الباثو على موقع النادي :

كتب المادة

ROBBINS

PATHOMA

شرح المادة

يوجد شرح للمادة كاملة من أريشيف بضعه اتر مع العلم ان الوحدة الثالثة كانت تعطى من قبل الدكتور غادة

PATHO ATHAR

شرح لاب الباثو

PATHO LAB

شرح المادة كاملة

شرح الفريق العلمي

PATHO - SCIENTIFIC TEAM

شرح قديم للفريق العلمي

تفاريغ

يمكن الاستفادة من تفاريغ الفقه السهلة

ATHAR PATHOLOGY NOTES

VEIN PATHO NOTES

تفاريغ دفعتي اتر و وريد قويات جدا

QUIZZES

كويزات للدكاترة



Dr.Ghada-sil Injury  
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Dr.Ghada-sil Injury  
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للوصل الى guidance الباثو و تفاريغ  
المادة كاملة :



كل اعمال الفريق العلمي تنشر على قناة  
التيليفرام

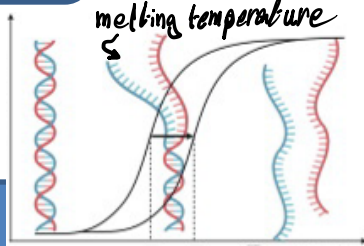


# Denaturation of DNA

لأنه ينتج عنها تكسر الروابط الهيدروجينية بين القواعد النيتروجينية  
وينحسر الشكل اللولبي.

Heating

Rupture of hydrogen bonds and separation of the two strands



The temp. that produces loss of 50% of DNA helical form is termed the **melting temp. (Tm)**

break down of hydrogen bonds between 50% of nitrogenous bases

درجة الحرارة التي تكسر  
الروابط الهيدروجينية بين نصف  
القواعد النيتروجينية فتفسر نصف  
الشكل اللولبي.

so it's reversible process

Denaturation  $\xrightleftharpoons[\text{cooling}]{\text{heating}}$  renaturation

Cooling of denatured DNA results in reformation of the double helix or **renaturation** or **reannealing**

\* الترابط بين Cytosin و Guanin مستقر ← الترابط بين Adenin و Thymine



بسبب عدد hydrogen bonds

• **Gene:** *segment of DNA* *تتعلق Function معين*

-It can be defined as a segment of DNA that code for a polypeptide chain depending on the sequence of the bases in the DNA. Every 3 bases form a code that determines an amino acid.

*3 basis يعطوا amino acid واحد*

*sequence of a.a من طريق تحديد*

*sequence of bases على sequence of bases* *proteins* *2 functions*

**A more expansive definitions:**

*types of RNA*

*(segments of DNA) genes* *يعطوا* *لها Functions*

*sequence of a.a in proteins*

*sequence of nucleobides on RNA*

*sequence of nucleobides on Gene*

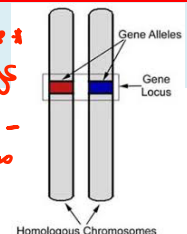
**A gene** is a part of DNA that gets transcribed into an RNA( mRNA, tRNA, rRNA or any other form of rna).

**A gene** is the basic physical and functional unit of heredity. Genes are made up of DNA. Some genes act as instructions to make molecules called proteins. However, many genes do not code for proteins.

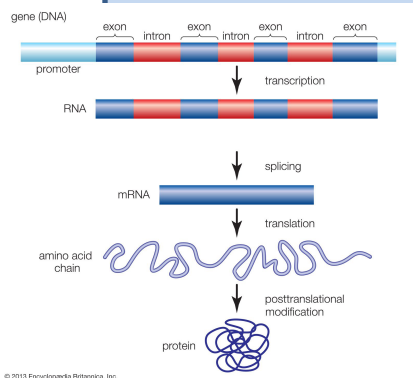
**A gene** is a region of DNA that encodes function.

-The position of a gene along a chromosome is called the locus of the gene.

*في somatic cells يوجد 46 كروموسوم (23 pairs)*  
*كل pair فيه كروموسوم من الأب والأخترمت الدم*  
*- في الكروموسوم موقع لجين معين يقابله على الكروموسوم الاخر جين*  
*مسؤول عن نفس الوظيفة.*



Most eukaryotic genes are discontinuous contain coding regions (**exons** or expressed sequences) and noncoding regions (**introns**).



في الجسم 20,000 جين. يعطوا بروتينات ولكن عدد البروتينات اكثر بكثير. على segment يعطي بروتينات غير

sequence of nucleotides ← Exons / introns

على sequence of nucleotides يعطي بروتين مختلف

← A + B بروتين

← A + C بروتين اخر

← A + D + C بروتين مختلف اخر وهكذا

Introns



Exons

coding regions ← Exons

يعني هاي المناطق هي التي تستجمع بطريقة معينة وتعطي a.a sequence

للمعنى ان sequence of basis فيها هي التي سوف يتم ترجمتها الى amino acids

\* عملية قس exons (تجميع) تكون من RNA الناتج من transcription of DNA. (اشبه اللقمة فوق)

# • Human genome:

→ All of the DNA inside the cell  
nucleus ← nucleus  
microconidia ← ليس

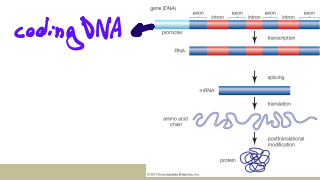
• All of the DNA of an organism is called its genome (Total DNA Content).

- The human genome is the complete set of nucleic acid sequences for humans, encoded as DNA within the 23 chromosome pairs in cell nuclei and in a small DNA molecule found within individual mitochondria.

- Human genomes include both protein-coding DNA genes and noncoding DNA.

proteins ← segments ←

proteins ← segments ←



- The content of the human genome is commonly divided into coding and noncoding DNA sequences.
- ❑ Coding DNA is defined as those sequences that can be transcribed into mRNA and translated into proteins during the human life cycle; these sequences occupy only a small fraction of the genome (<2%). *of genome*
- ❑ Noncoding DNA is made up of all of those sequences (98% of the genome) that are not used to encode proteins.
- Some noncoding DNA contains genes for RNA molecules with important biological functions (noncoding RNA, for example ribosomal RNA and transfer RNA).

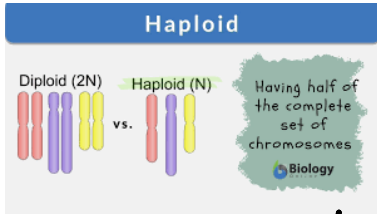
Types of RNA *tRNA*

- **There are an estimated 19,000-20,000 human protein-coding genes. The estimate of the number of human genes has been repeatedly revised down from initial predictions of 100,000 or more as genome sequence quality and gene finding methods have improved, and could continue to drop further.**
- **Protein-coding sequences account for only a very small fraction of the genome (approximately 1.5%)**



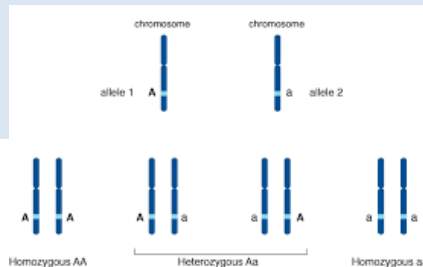
somatic cell تحتوي 6 4 كروموسوم (23 pairs)

كل pair يحتوي على 2 chromosome sets  
 23 من الاب (sperm set) من 23 من الام (egg set) :: في somatic cell تحتوي على 2 sets



↪ single set of chromosomes

- Haploid human genomes, which are contained in germ cells (the egg and sperm gamete cells) consist of three billion DNA base pairs, while diploid genomes (found in somatic cells) have twice the DNA content.
- Haploid refers to the presence of a single set of chromosomes in an organism's cells. In humans, only the egg and sperm cells are haploid.



Which of the following best describes an allele?

**A) Different forms of the same gene.** *Most common*

B) All the DNA within an organism *GENOME*

C) A section of DNA that codes for a protein *GENE*

D) The interaction of DNA with the environment

E) Similar forms of different genes

Allele: different versions of the same gene

Chromosome: long DNA strand

Gene: codes for a protein

gene/characteristic: eye color  
 alleles/traits: B-brown eyes  
 b-blue eyes

... AACCTGA  
 TGTGACT B vs b  
 AACCTGA  
 TTGGACT

لون العيون : gene  
B : لون العيون الزرقاء  
b : لون العيون السوداء

different form of same gene  
variant of gene

- **Genotype** : if the two genes (alleles) at certain locus in an individual are indistinguishable from each other, the genotype is homozygous for these genes- if the two genes are different from each other, the genotype is said to be heterozygous. (what is on the inside of the genes in DNA)
- An **allele** is a variant form of a given gene.
- **Phenotype** : the physical or biochemical expression of the genotype (what is the outside or the observable traits)
- Most complex traits are influenced by many genes and by environment e.g. skin color, hair color, weight, behavior and some diseases like diabetes mellitus. This means that the same genotype can result in different phenotype depending on the environment.

الطراز الشكلي

# PHENOTYPE

-The expression of the trait

## EXAMPLE

-Two possible phenotypes



-Genotypes BB and Bb both give the same phenotype, blue eyes

-Pairs of alleles, like Bb or bb, can be referred to in two ways

الطراز الجيني

# GENOTYPE

-Refers to the exact pairing of alleles

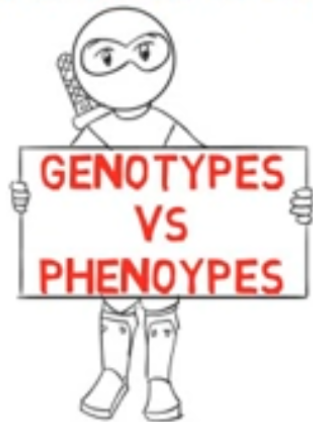
## EXAMPLE

"B" - Blue eyes      "b" - Green eyes

-Three possible genotypes

BB Bb bb

\*Not concerned with expression, only pairing of alleles



-Genotype refers to the pair of alleles

-Phenotype refers to the expression of the trait

B : blue color

b : green color

Phenotype



Genotype

BB or Bb

bb

\*توزيع موثوق  
environment

M : white color of skin

m : black color of skin

MM MM

ابيض ابيض

MM MM

ابيض ابودح بسبب environment

مثلاً: شخصيت عندهم نفس الطراز الجيني (Genotype) وهو MM

.. يكون لديهم نفس اللون الابيض (phenotype)

ولكن احدهما اصبح ذو بشرة سوداء بسبب environment حوله

→ cell membrane/organelles

- **Eukaryotic cells:** cells that are divided by internal membranes into subcellular compartments such as the nucleus, mitochondria, and endoplasmic reticulum.
- **Prokaryotic cell** (e.g. a bacterial cell) is not subdivided by internal membranes and so characteristically has no definite nuclear membrane. Each cell contains one single double-stranded supercoiled circular chromosome.

-In addition, most species of bacteria also contain small and circular extrachromosomal DNA molecules called plasmids. Plasmid DNA carries genetic information & may carry genes that convey antibiotic resistance to the host bacterium.

plasmids ← موجودة في bacteria وليس في humans

plasmids ← يكون عندها genetic material الخاصة بـ antibiotic resistance

بعض انواع bacteria تعمل resistance (لأنواع معينة) من antibiotics

لأنه يسهلها تعمل صيغ هو انه عندها genes على plasmids وتطاع مثل enzymes بيكسر antibiotics

Chromatin refers to a mixture of DNA and proteins that form the chromosomes.

- **Chromatin** consists of very long double-stranded **DNA molecules** and a nearly equal mass of small basic proteins termed **histones** as well as a smaller amount of **non-histone proteins** (most of which are acidic and larger than histones) and a small quantity of **RNA**.

مهمة جداً لأنها البروتينات التي يلتصق عليها DNA حتى يتقل size

- *Non-histone proteins: This class of proteins includes the various transcriptional factors, polymerases, hormone receptors and other nuclear enzymes.*

# DNA Tertiary structure:

It is the folding of long DNA molecule to decrease its size and allow its packing inside the cell this is called (**DNA supercoiling**)