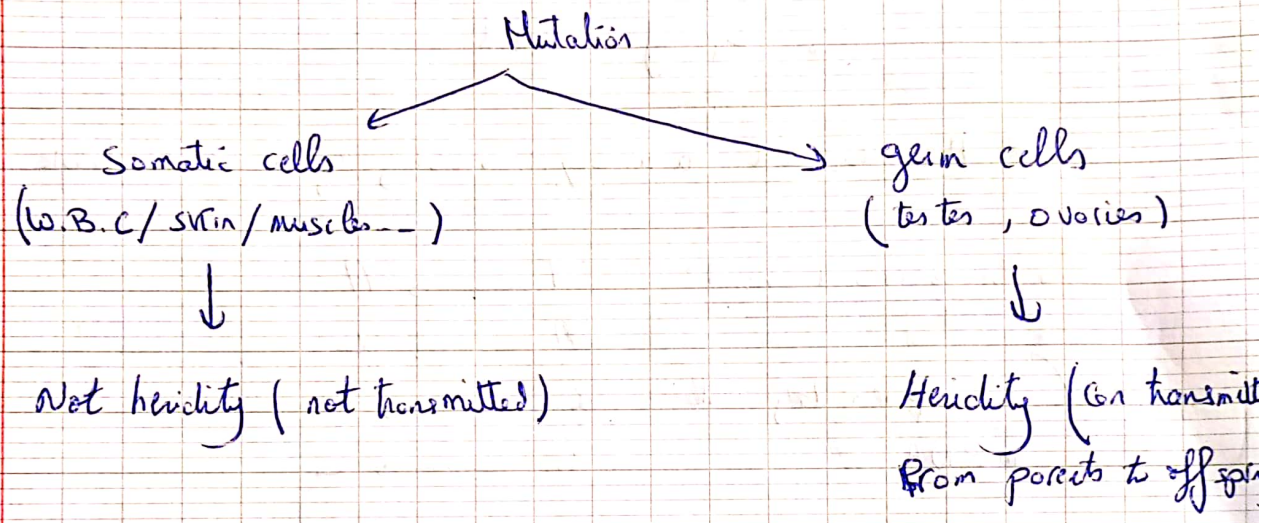
Chapter 3

→ Doc 1: Mutation & environment:

* Mutation is any change in nucliotide seq of certain gene.

* How mutation can be transmitted:



* How environment affect Mutation:

environment agents Caused by some mutation → gene Coding
for protein → or that leads to abnormal protein →
its growth → skin Cancer.

→ Doc. 2: Mutation & multiple alleles:

* protein synthesis:

DNA —(First step: by transcription)→ mRNA —(second step: by translation)→ amino acid seq. → protein

→ specific trait

* How to det. a.a. seq.: • using genetic code table

- transcribed strand: T → A, A → U, C → G, G → C
  - ↳ Complementary with mRNA
- Non-transcribed strand: T → U.
  - ↳ identical to mRNA
- Note: Codon. (AUG ...)
  - ↑ 1st nucleotide
- Note:

any change DNA seq. may lead to change a.a. seq → change phenotype (trait).

* Types of Mutation:

① **Substitution:** replaced nucliotide by another one.

↳ **types for substitution:**

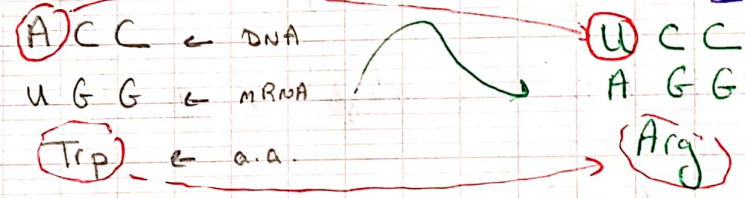
- **Silent:** - it change the DNA and mRNA only
  - a.a. seq doesn't change or doesn't affect

- **non-sense:** - In a.a. ⟶ stope Codon

  thus translation become in complete.

- **Missense:** ⟶ change 1 nucliotide ⟶ change mRNA ⟶ change a.a. seq. (Rep. 1 DNA by another or more)

ex:



A replaced by U

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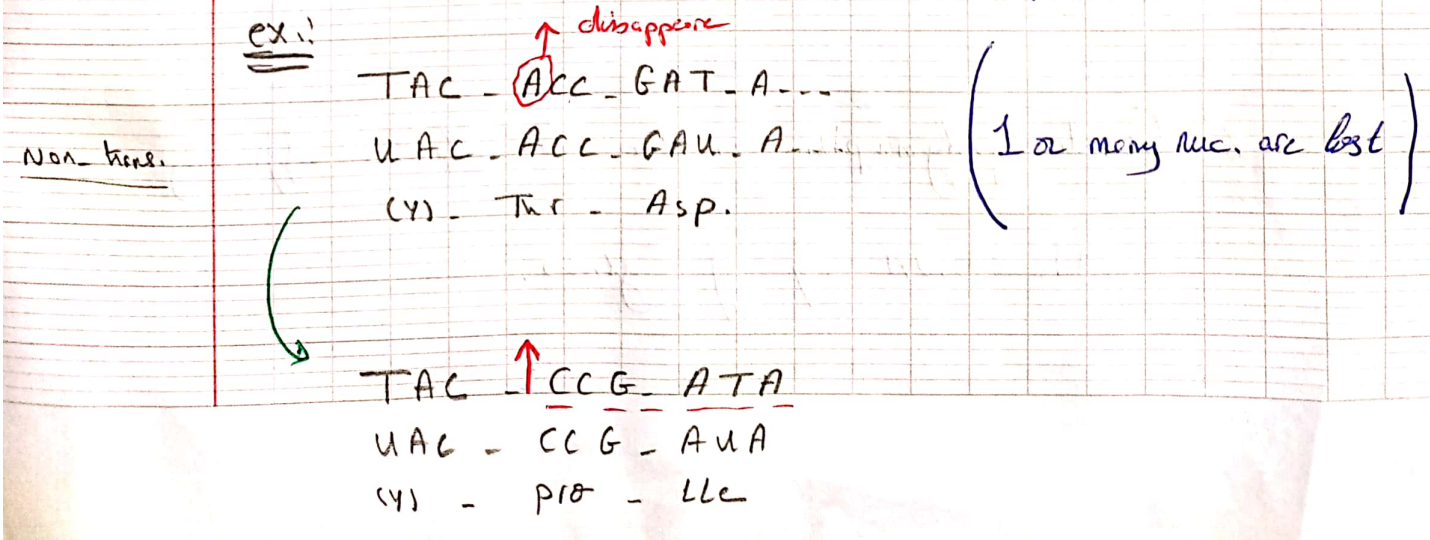
② **Deletion:** one nucliotide seq. disappear (حذف نيوكليوتيد من السلسلة)

ex:



(3) Insertion: 1 or more nucliotide was added.

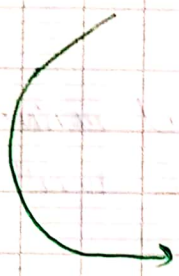
ex:

Non-frame:

TAC - ACC - ACG - A - - -

UAC - ACC - ACG - A - - -

Tyr - Thr - Thr



was added

TAC - GAC - CAC - GA -

Thyr - Asp - His

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* Mutation in Blood groups:

- Blood A ⟶ antigen A on surface
- Blood B ⟶ antigen B " "
- Blood O ⟶ antigen O

The 3 Blood groups common in (H antigen), but differ in Suger added.

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* Genetic polymorphism is due to mutations affecting the DNA seq of genes.

* How to answer Q Compare:

* Compares → total n.b of nucleotide seq. (> or <)
  → Both nucleotide seq are identical except in (___ 8 ___) triplets where ___ present in normal but absent in mutied.

For deletion and insertion

* Compares → number of nucleotide seq of both alleles or genes identicle except in ___ nucleotide of ___ triplet where ___ rep. by ___

For substitution

(imp.) * Q: explain how change n. seq leads ___ 8

Mutation by ___ in gene coding for ___ in ___ and ___ triplet
⇒ leads to (change / longer / shorter) mRNA by transcription
⇒ leads to change a.a seq by translation
⇒ change structure of ___
⇒ abnormal ___
⇒ + teat

→ Doc. 4 : Detection of genetic polymorphism

* **Restriction enzyme** → it cut the DNA molecule at specific site.

  • n.bs of restriction fragments = n.bs of cleavage site + 1

  • Size of restriction fragments:

– In normal allel cuts bet ___ in position ___ and ___ in position ___ that give fragment of length ___

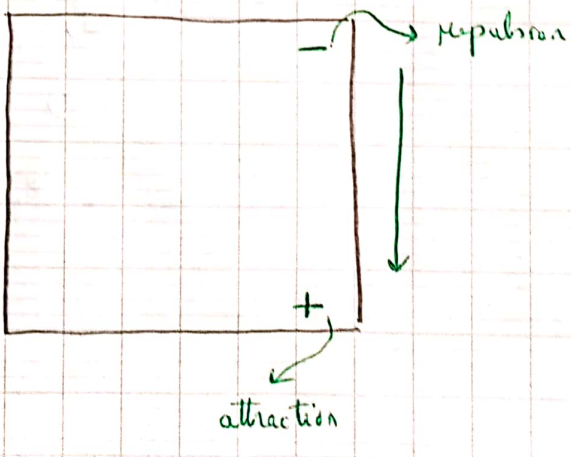
الأطول - الأقل

* **Gel electrophoresis:**

↳ technique used to sep. DNA fragments acc. to their size.

→ Large fragments migrate slower than small fragments

→ DNA migrated to the pole (from -ve ple to +ve)



→ Doc 5: Genetic Identity:

* **FISH Method:**

↳ steps: - Denaturation : sep of 2 strands of DNA
- Hybridization: add a monolocus probe that binds to specific Complementary DNA
- Visualization:

↳ Aim: to determine the locus of gene on Metaphase.

* **Genetic Map:** it Constructed by using ≠ monolocus probe with diff. Colors to locate many genes.

* **DNA Finger print:**

↳ steps: 1- Cut the double strand DNA with specific Restriction enzyme
2. Electrophoresis ---
3- Southern Blotting ---
4- Denaturation & Hybridization ---
5- Auto bio graphy ---

DNA Analysis

- Detection of genetic polymorphism
  - ↓
  - Determine the phenotype of an individual
- DNA fingerprint → Detection of genetic identity
  - Identify criminal
  - paternity test
- Determine the location of gene
  - ↓
  - FISH tec.