# **20.4 – Mutations and Genetic Variation**

Read through pages 687-693 and answer the following questions

Define the following:

1. **Point Mutation**:
2. **Gene Mutation**:

Fill in the following table on the types of mutations:

|  |  |  |
| --- | --- | --- |
| **Type of Mutation** | **Description** | **Example** |
| Silent Mutation |  |  |
| Missense Mutation |  |  |
| Nonsense Mutation |  |  |
| Deletion |  |  |
| Insertion |  |  |
| Frameshift Mutation |  |  |
| Translocation |  |  |
| Inversion |  |  |

Causes of Gene Mutations

Some mutations are simply caused by an error during DNA replication and are known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Others arise from exposure to mutagenic agents and are known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

### Mutation Agents:

|  |  |
| --- | --- |
| Damaging Agent | Description |
| Mechanical | * Pushing or tugging the chromosome |
| Chemical | * Mustard gas, nitrous acid etc |
| Medications | * Some antibiotics |
| Radiation | * X-rays, UV light, cosmic rays |
| Replication Mistake | * As DNA replicates, natural mistakes do occur in S-phase of cell cycle |
| Nutritional | * Lack certain amino acids (essential) in the diet 🡪 cannot make correct proteins in the right quantity |
| Biological | * Most viruses inject their DNA into ours that now becomes part of us * If in gamete 🡪 part of offspring! |

# Inferring Relationships from DNA Sequences

Define **phylogeny**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What two organelles in cells also contain their own DNA that is separate from the nucleus’ DNA? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What is the difference between Mitochondrial DNA and nuclear DNA in how it is inherited? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Explain how base sequences in nucleic acids contained in the nucleus (or mitochondrial or chloroplast DNA) gives evidence for the relationships among organisms of different species.

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**Do:** Texbook Questions p.694 #2, 5, 7 (read through info from question #10, but you don’t need to do the research

DNA & ONCOGENES

Cancer = uncontrolled cell growth (division)

What is an *oncogene*?

* ***A cancer causing gene*** present or developed in cells
* Often due to a “*regulator*” gene that has been mutated
* A “*regulator”* gene is necessary to control the function of other genes
* Normally “*regulator”* genes produce a “*repressor”* protein which binds to a oncogene (*structural gene*) turning it **OFF!** (see below)

regulator

gene

oncogene

Produces

Regulator

protein

Binds protein

to oncogene

(turns off)

* If the regulator gene has mutated **OR** is removed, the *repressor* protein is missing **OR** its not functioning properly. Therefore, the “*oncogene*” gene may continue to act **UNINHIBITED!** (see below)
* If the *structural* gene is involved in cell division: For example IF helicase or gyrase the DNA will continue to unzip and replicate itself. The cells will continually divide uninhibited resulting in **CANCER!**

**Therefore, Cancer is either the mutation, or the movement of the regulator gene**

Cancer cells differ from normal cells in that they….

* divide more quickly
* have no function
* do not adhere to one another
* move throughout the body (metastasis)