**Variation – Notes**

Mutations:

* Germline mutations: Sudden **changes in the genes within gametes passed to offspring** that can **introduce new genes into the gene pool**.
* Types of mutations include:
* **Point mutation** – Changes in **one base** which then **changes the triplet code** and then **changes the amino acid** which **changes the protein type**.
* **Duplication** – Sections of DNA become **doubled**.
* **Insertion** – **Extra DNA** put into the **wrong spot**.
* **Deletion** – Sections of DNA become **removed**.
* **Non-disjunction** – Correct number of chromosomes **don’t separate properly during Anaphase II**.
* **Translocation** – Parts of a chromosome **break off and bond to the wrong chromosome** (**independent assortment**).

Independent assortment (random assortment in Anaphase I and Anaphase II):

* When 2 gametes unite at fertilization, the resulting cell has a combination of genes that’s different from either parent.
* The chromosomes exist in homologous pairs.
* When the chromosomes move apart during Anaphase I and Anaphase II, they do so independently.

Epigenetics:

* Factors that either enhance or inhibit gene expression.
* DNA methylation – Methyl tags cause DNA to be coiled too tightly around the histone, inhibiting gene expression and switching the gene off.
* Histone acetylation – Histones move apart and allow DNA polymerase enzyme to “read” DNA code. DNA is uncoiled, enhancing gene expression and switching the gene on.

Random fertilization:

* **Any sperm** is capable of fertilizing the ovum.
* It **isn’t only one sperm** that always fertilizes the ovum.

Crossing over in Prophase I of meiosis:

* The point where 2 chromatids cross over is called a **chiasma** (plural: **chiasmata**).
* When crossing over occurs, the result is a **new combination of alleles** along the chromosome. This is called a **recombination**.
* The **mixing of maternal and paternal DNA in the homologous pairs** is so that not every child is identical.

Random mating:

* Members of the species **choose a mating partner fairly randomly**.