

- **Cell division in Eukaryotes:**

2- Mitosis

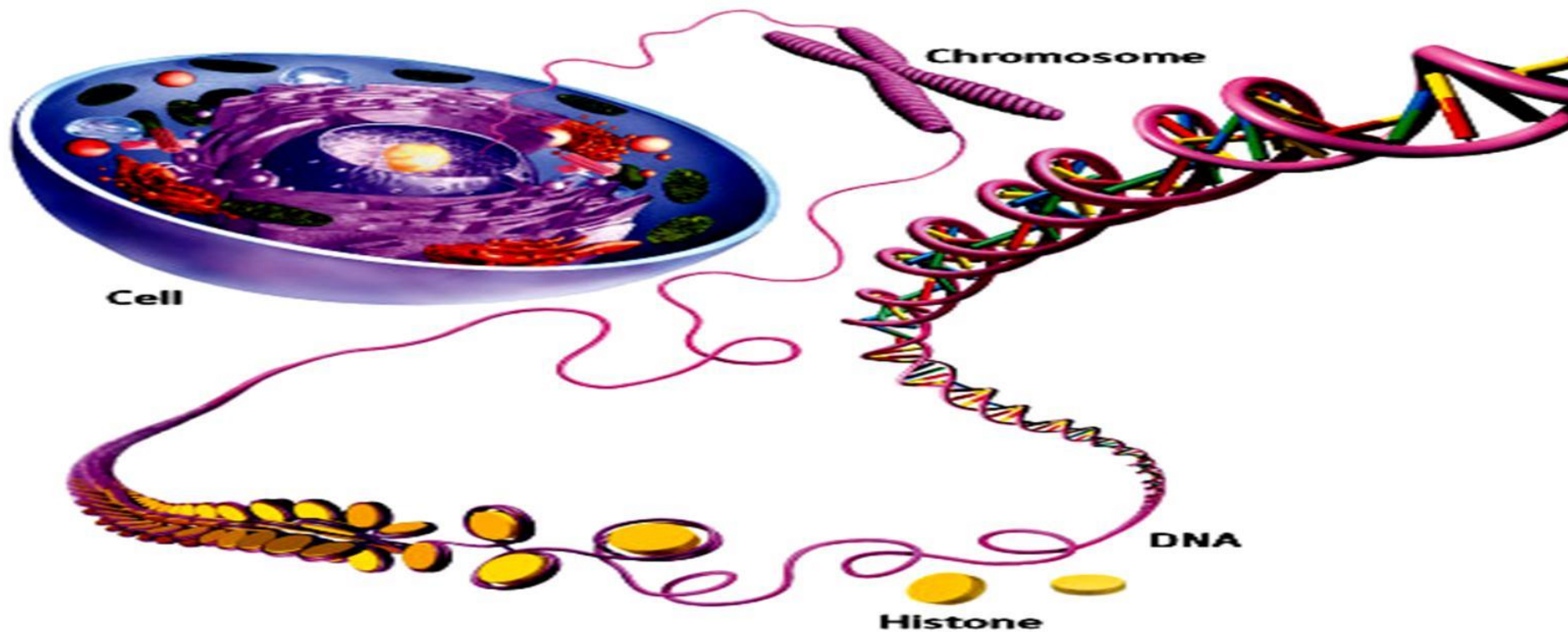
- Form of asexual reproduction in eukaryotes.
- For growth, development and repairing damaged cells and tissues.

3- Meiosis:

- Form of Sexual reproduction in eukaryotes.
- Involves production of gametes in reproductive organs.

Chromosome structure:

- Before cell division → DNA is very long, very thin, uncoiled and invisible under microscope called "Chromatin".
- When preparing to cell division:
 - DNA Replicates (copies itself).
 - DNA coils tightly around histone proteins to form shorter, thicker, coiled and visible thread like structure called "Chromosomes".



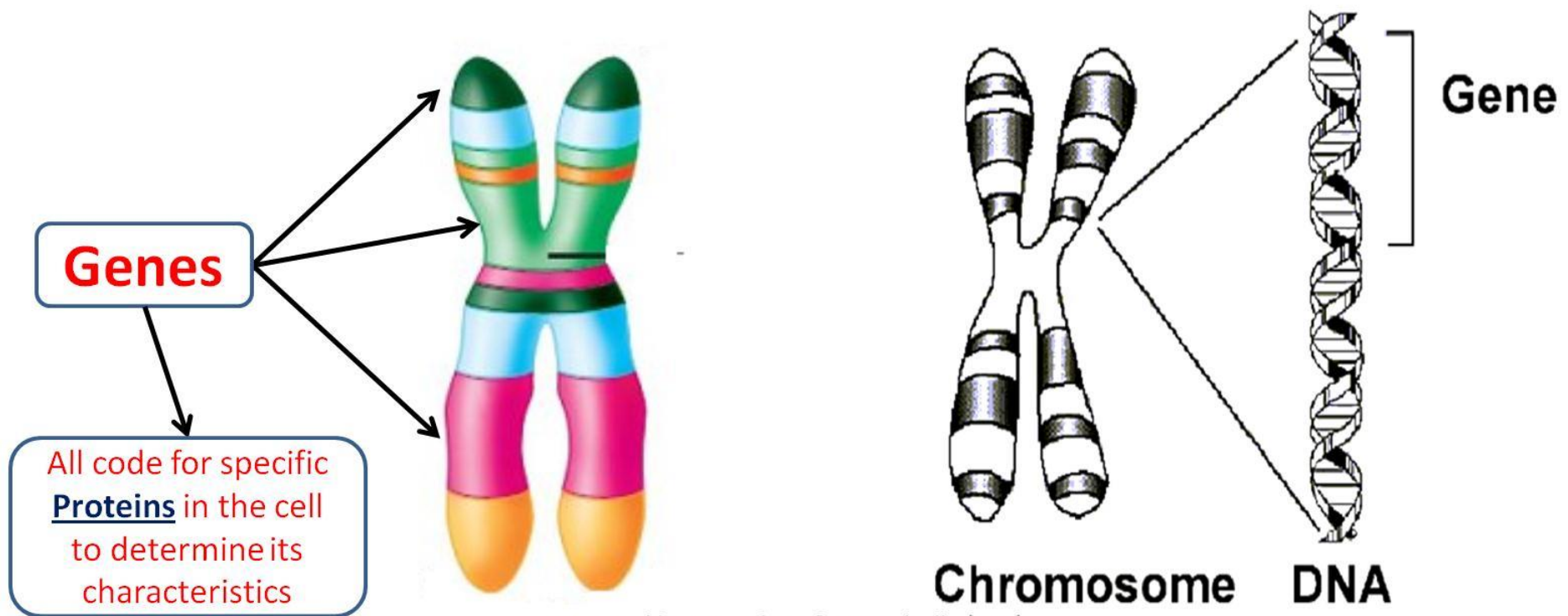
-Genes:

- Is a segment of DNA that codes for specific proteins in each cell.

-Proteins:

- Are the building blocks of cells to determine the function and the shape of each cell. → So the combination of proteins in each cell determines the features of the living organism..

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Page 18 of 62



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Page 25 of 62



Eukaryotic cells

Somatic cells

-All body cells that contain chromosomes in pairs (homologous chromosomes)

- Called: "**Diploid cells**" ($2n$)

-There are **2 copies from each chromosome**. One from male gamete and other from female gamete.

-Ex : skin cells, liver cells, stem cells.....

Gametes

-All sex-cells that contain one set of chromosomes (no homologous pair)

- Called: "**Haploid cells**" ($1n$)

-**One copy of each chromosome** in each gamete.

-Ex. : Sperm and egg cells → in animals.

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page 31 of 62

-Importance of reducing NO. of chromosome into $\frac{1}{2}$ in gametes →

- To restore the diploid number of chromosome in the embryo and to maintain a stable constant number of chromosomes passing from one generation to next generation in a certain species.

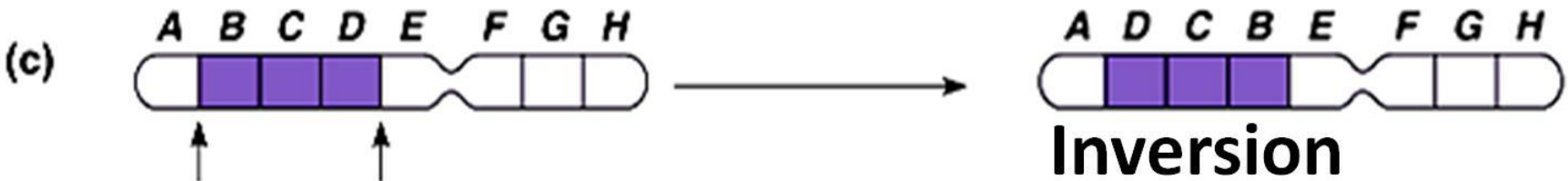
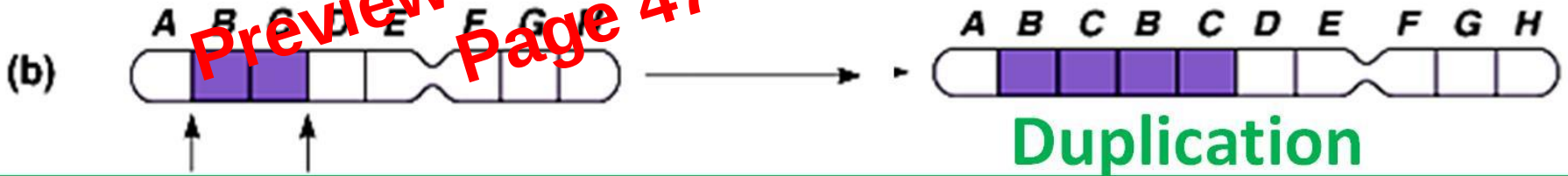
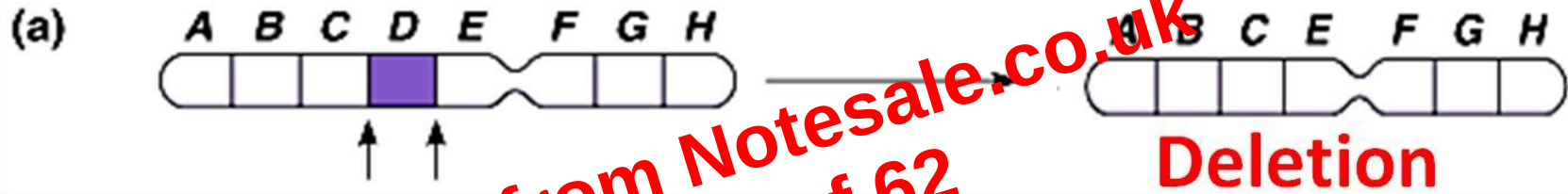
-Mutation:

- Any sudden change in chromosome that may lead to abnormalities and defects in the new offspring.

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Page 36 of 62



Types of chromosomal mutations:



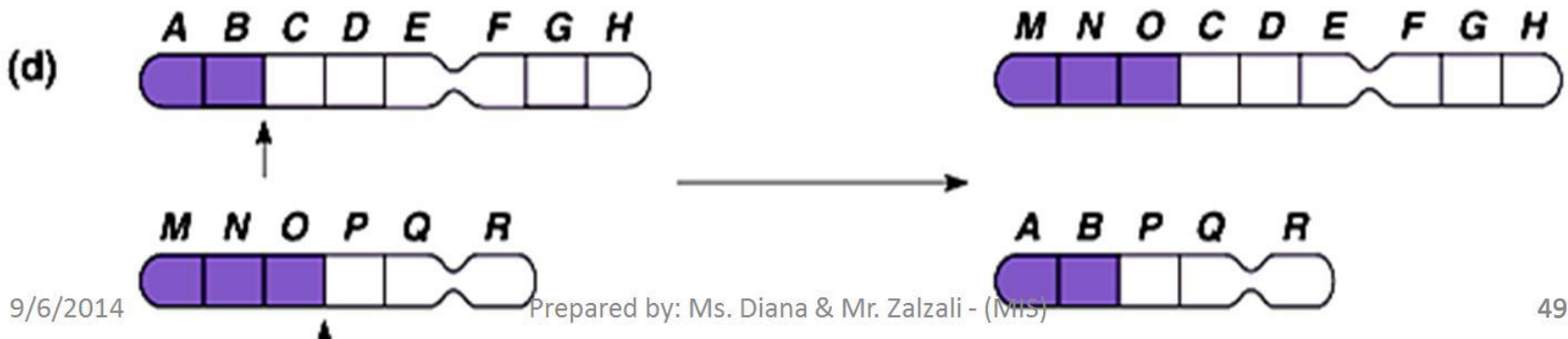
3- Duplication:

- A piece or segment of chromosome attaches to its homologous. So the homologous will carry 2 copies of certain genes.



4- Translocation:

- A piece of chromosomes is cut off and reattaches itself to a non-homologous chromosome.



Prenatal tests :

-Medical techniques to detect abnormalities in fetus (during pregnancy).

1- Karyotyping :

- A technique of taking enlarged photo of all chromosomes, arranged by size and shape into pairs.

* Its advantages:

-Useful to inform doctors about chromosomal abnormalities in the fetus (e.g. down's syndrome)

- Useful to know the sex of the fetus.

* Disadvantages:

-Could be inaccurate because it detects abnormalities in the number, size and shape of chromosomes but cannot detect gene mutations.