

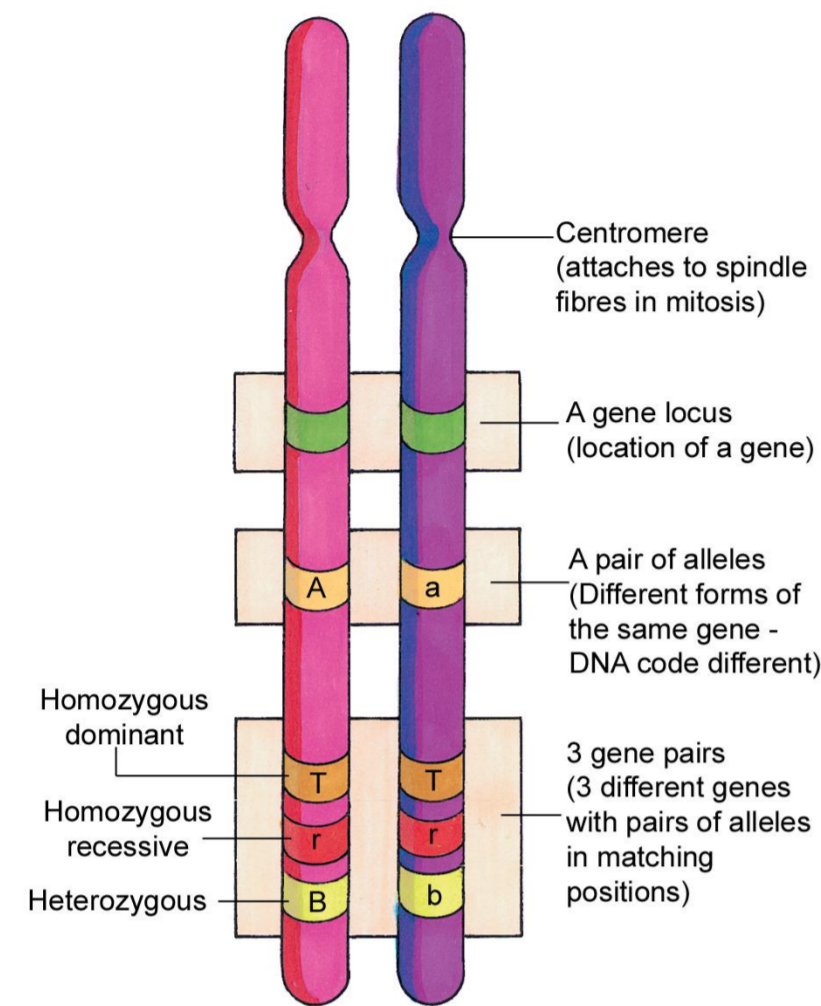
# 2.3 Cell Continuity & Cell Division

## Cell Continuity

All cells develop from pre-existing cells

### Chromosomes

A PAIR OF HOMOLOGOUS CHROMOSOMES



- Structures in Nucleus, made of DNA & Protein
- Not dividing = Chromatin (long thin threads)
- When dividing = Chromatin forms a numbers of clearly distinguishable chromosomes
- Each species has a definite no. of chromosomes, Humans= 46 chromosomes
- Each chromosomes has 1000's of genes

### Haploid

A Haploid cell has one set of chromosomes (n), e.g. Egg cell and sperm are haploid, n = 23

### Diploid

A Diploid has two sets of chromosomes (2n), e.g. somatic cells, 2n = 46

Chromosomes are in pairs (homologous pairs) in diploid cells. One chromosome of each pair comes from the mother and the other comes from the father.

### Cell Cycle

Describes the life of a cell. It includes the period between divisions when the cell is not dividing, called Interphase.

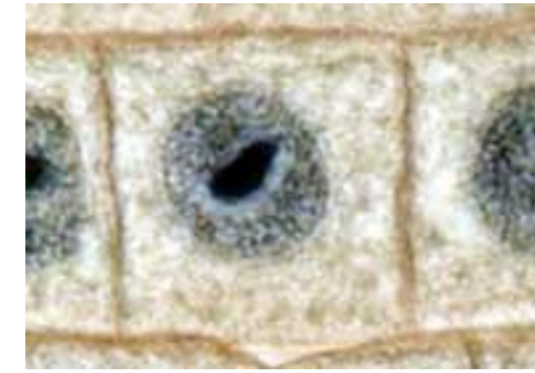
Nucleus divides = Mitosis

Cytoplasm divides = Cell division

### Mitosis

- Mitosis is a form of nuclear division in which one nucleus divides to form two nuclei, each containing identical sets of chromosomes
- Two new IDENTICAL daughter cells are produced

### Interphase



- Longest phase in cell cycle
- Chromosomes elongated = chromatin
- Cell very active in Interphase, produces new mitochondria, chloroplasts, etc. and chemicals needed for growth

### Prophase



- Chromosomes contract and become visible
- Each chromosome appears as a duplicated strand
- Fibres appear in cytoplasm
- Nuclear membrane starts to break down

### Metaphase



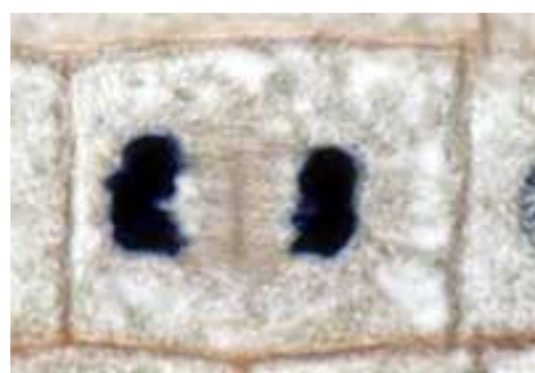
- Chromosomes line up across the equator of cell
- Fibres attach to chromosomes at centromere

### Anaphase



- Fibres contract, chromosomes pulled apart
- Chromosomes pulled to opposite ends of cell.
- Hence, identical set of genes pulled to each end of the cell

### Telophase



- Nuclear membrane forms around each of the two sets of chromosomes
- Chromosomes elongate within each nucleus

Mitosis is complete

Once complete, original cell divides\* to form two cells

\* By constriction in an animal cell or cell plate develops in a plant cell

### Function/Role of Mitosis

In Unicellular Organisms it is a method of reproduction

In Multicellular Organisms it is responsible for growth, renewal and repair of cells

### Cancer

Rate of cell division (mitosis) is carefully controlled. Sometimes a cell or group of **cells lose the ability to control the rate of cell division.**

They form a mass of cells called a tumour which can be benign (harmless) or malignant (cancerous).

### Causes of Cancer

Caused when normal genes are altered to form cancer-causing genes called oncogenes.

Brought about by cancer causing agents called carcinogens, e.g. cigarette smoke, asbestos fibres, x-rays & ultraviolet radiation and some viruses.

Most cancers can be cured with Radiation (burn out cancer), Chemotherapy (Chemicals slow down mitosis) and surgery.

### Meiosis – Reduction division

Is a form of nuclear division in which the number of chromosomes is halved.

Diploid cell (2n) ÷ meiosis → 4 haploid cells (n) all genetically different

Meiosis occurs in the ovaries and testes to produce **gametes** called eggs and sperm so there are 23 chromosomes in each egg and sperm

### Function/Role of Meiosis

In Multicellular Organisms

Allows sexual reproduction by producing haploid gametes

Allows new combinations of genes – variations

### Where does Meiosis occur?

In the human – in the testes and ovaries

In the flowering plant – in the anthers and ovules