CALCULATING MITOTIC INDEX

Introduction

Reproduction is a function of life and involves the formation of new cells from a progenitor source (a 'parent' cell). This cell division produces new 'daughter' cells that can form multicellular tissues or entirely new organisms. In eukaryotes, the process of cell division involves a sequence of events that are collectively described as mitosis. Mitotic division is a fluid process whereby one stage evolves into the next, meaning the identification of stages can be somewhat subjective.

However, each stage is characterised by certain events that must occur within a consistent order:

- **Prophase** – Chromatin appears as fine threads (chromosomes) within a nuclear boundary.
- **Metaphase** – Chromosomes are thick and arranged along the equatorial plane of the cell.
- **Anaphase** – Chromatid separation can be seen (chromosomes form two distinct clumps).
- **Telophase** – Chromosomes appear at poles as chromatin masses within nuclear boundaries.

The mitotic index of a cell population is the ratio between the number of cells in mitosis and the total number of cells. It can be used as a clinical tool to determine the degree of cell proliferation within a tissue (e.g. for cancer identification). The mitotic index is calculated using the formula:

$$\text{Mitotic Index} = \frac{Cells\ in\ Mitosis}{Total\ Number\ of\ Cells}$$

Aim

To use prepared slides *(Allium spp)* to observe cells in mitosis and determine the mitotic index.

Hypothesis

Suggest how the mitotic index will differ between the tip and the base of a growing plant shoot.

Results

Count the number of cells in each mitotic stage to determine the mitotic index for the shoot tip.

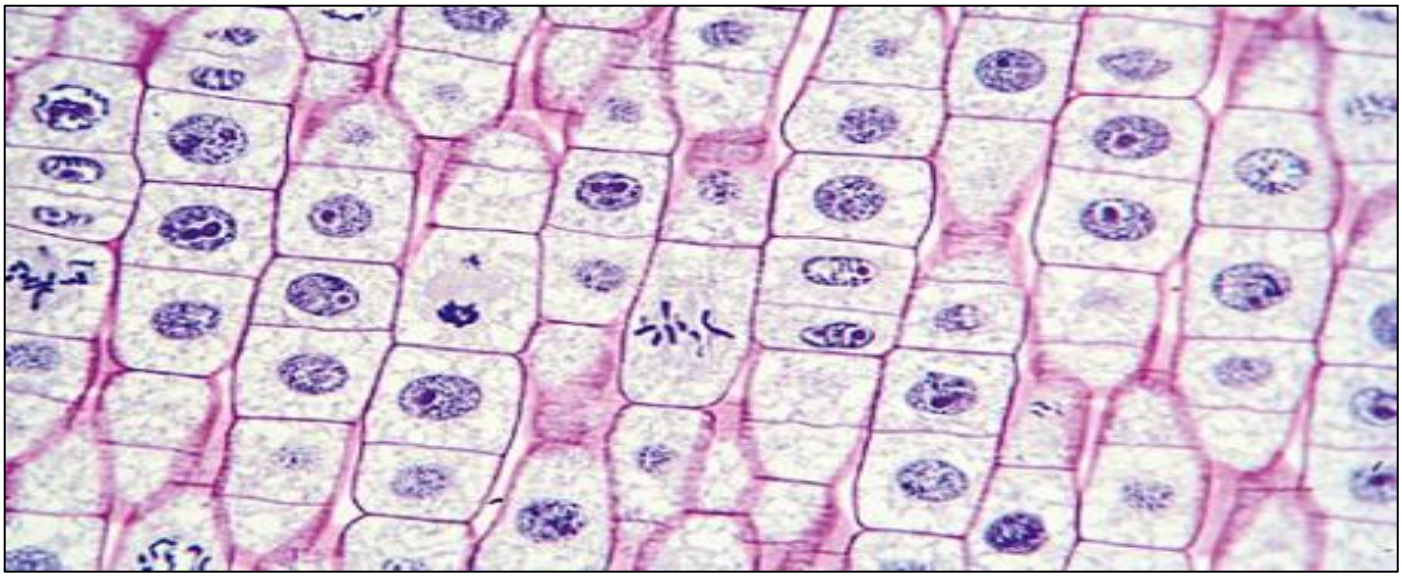
Interphase	Prophase	Metaphase	Anaphase	Telophase	**Total**

Mitotic Index Calculation:

Discussion:

1. Outline how the process of cytokinesis differs between animal and plant cells.

2. Calculate the mitotic index of the micrograph shown below (only count cells with visible DNA).



Mitotic Index Calculation: