

Edexcel IAL Biology A Level

Core Practical 6

Prepare and stain a root tip squash to observe the stages of mitosis.



Equipment list

- Root
- Scalpel
- Ruler
- Boiling tube
- Hydrochloric acid
- 25 cm³ measuring cylinder
- Pipette
- Distilled water
- Paper towels
- Microscopic slide
- Cover slip
- Mounted needle
- Stain
- Optical microscope



Method

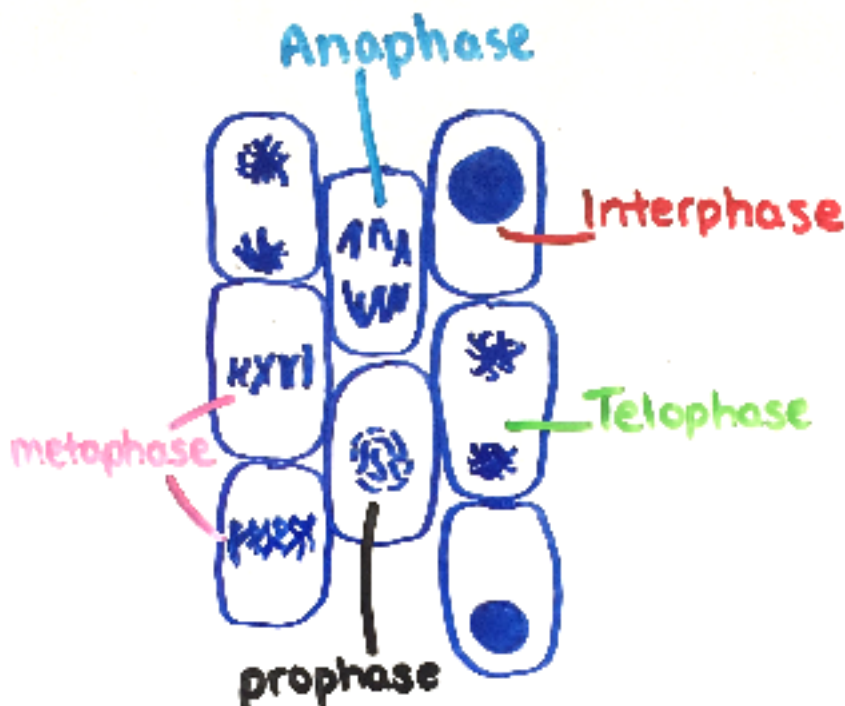
1. The **ends of a root or shoot** are where growth and therefore **mitosis** are occurring, so to observe mitosis the plant tissue to be observed must be cut from these areas. Use a scalpel to measure and cut the end 1 cm of the root.
2. Measure out 10 cm³ of 1 mol/dm³ hydrochloric acid into a boiling tube and place it in a water bath at 60°C.
3. Transfer the root tip section into the boiling tube and leave it for 5 minutes.
4. Remove the tip and use a pipette filled with distilled water to rinse it. Leave it to air dry on a paper towel.
5. Now cut the end 2mm of the root tip and place this on a microscopic slide. Use a mounted needle to spread the specimen out forming a thin layer that will allow light to pass through when observing it under a light microscope.
6. Use a pipette to apply a couple drops of stain to the specimen, the stain binds to chromosomes making them easier to see. There are several stains that can be used including Toluidine Blue O and Feulgen Stain.
7. Finally, place a cover slip on top of the specimen on the microscopic slide. **Press down firmly, further spreading and thinning** the specimen for observing. The slide can now be viewed under an optical microscope.



Risk assessment

Hazard	Risk	Precaution
Scalpel	Cuts from sharp edges	Take care when using it When carrying it around the lab place on a white tile Cut the root tip on a chopping board
Glassware	Cuts from sharp edges if broken	Have a dustpan and brush in the lab to sweep up and dispose of any broken glass immediately Avoid placing glassware on the edges of the lab benches Keep away from edge of desk
Hydrochloric acid and stain	Toxic if ingested or enters body; HCl is corrosive on skin.	Wear goggles and gloves when handling these Replace stoppers immediately after use Keep away from edge of desk

Conclusion



You need to be able to recognise these stages of mitosis when viewing cells under a microscope.

The mitotic index can be calculated by **counting the number of cells with visible chromosomes** - these are the number of cells undergoing mitosis - and also counting the **total number of cells visible**.

$$\text{mitotic index} = \frac{\text{cells in mitosis}}{\text{total number of cells}}$$

