Required Practical 2: Root Tip Squash

Prepare a stained root tip squash to see mitosis, then calculate the mitotic index.

Root tip squash: four steps, each with a reason

1 CUT the tip — meristem: cells dividing by mitosis

2 WARM in acid — (HCl) separates / softens the cells

3 STAIN — chromosomes become visible

4 SQUASH — thin layer, one cell thick: light passes

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

Key terms

root tip squash	a slide made by squashing a stained root tip under a coverslip.
meristem	the growing region at the tip, where cells are dividing by mitosis.
acid hydrolysis	warming in hydrochloric acid separates and softens the cells.
stain	binds to chromosomes so they are visible.
mitotic index	number of cells in mitosis / total number of cells observed.
actual size	image size / magnification.

I can...

- [ ] Preparation of stained squashes of plant root tip cells
- [ ] Set-up and use of an optical microscope to identify stages of mitosis
- [ ] Calculation of mitotic index
- [ ] Measure apparent size of cells and calculate actual size

EXAM TRAP

Mitotic index is cells in mitosis over total cells observed, not over cells in interphase. Always give the reason for each step: tip because of dividing cells, squash so the layer is one cell thick.

5 marks: what earns them

1. Cut the tip of the root, because the meristem there has cells dividing by mitosis
   Not: the tip is softer; cut the root with no tip or no reason
2. Warm in (hydrochloric) acid to separate / soften the cells
   Not: kills the cells with no separation; to stain
3. Add a stain so the chromosomes are visible
   Not: stain the cells, with no mention of chromosomes or visibility
4. Squash under a coverslip to make a thin layer, one cell thick, so light can pass through
   Not: flatten it with no reason; slide the coverslip
5. Mitotic index = number of cells in mitosis / total number of cells observed
   Not: cells in mitosis / cells in interphase; cells in mitosis / number of fields

Remember

Cut the tip, warm in acid.
Stain the chromosomes, squash thin.
Index = mitosis / total.

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