BRIGHTON COLLEGE

Biology at home: Tropisms in cress seedlings

Tropisms in cress seedlings

Plants produce chemicals called hormones that regulate their growth and development.

Auxins are involved in the growth of shoot tips and root tips, moving through the plant's internal transport system in solution. Auxins promote growth in the shoot but inhibit growth in the root.

They are involved in the growth responses of plants to light (**phototropism**) and gravity (**geotropism**).

Shoots are positively phototropic (grow towards light) and negatively geotropic (grow away from gravity).

Roots are positively geotropic and negatively phototropic, as you would expect!

You will need:

- *Kitchen paper/cotton wool*
- *Approximately 100 cress seeds or one punnet of cress (pre-grown) from a supermarket*
- *Cardboard (a cereal box will be perfect!)*
- *Scissors*

Preparation (if not purchasing pre-grown cress):

Five days before the experiment, sow the cress seeds on **three** 10x10cm squares of moist cotton wool or kitchen paper. Spread the seeds thinly, about 30-40 seeds to each square, and allow to germinate in darkness in a suitable container (e.g. a sandwich box).

Examine daily to check that the cotton wool or kitchen paper remains moist. By day 5 or 6 the cress should be about 40mm long and suitable for the experiment.

Expose the seedlings to a light from directly overhead (ideally) for 12-24 hours before the experiment so that they turn green.

The experiment:

You have prepared three sets of cress seedlings growing on moist cotton wool.

1. Mark three plates as shown in Figure 1 and place one of your squares of cotton wool and cress on each plate.

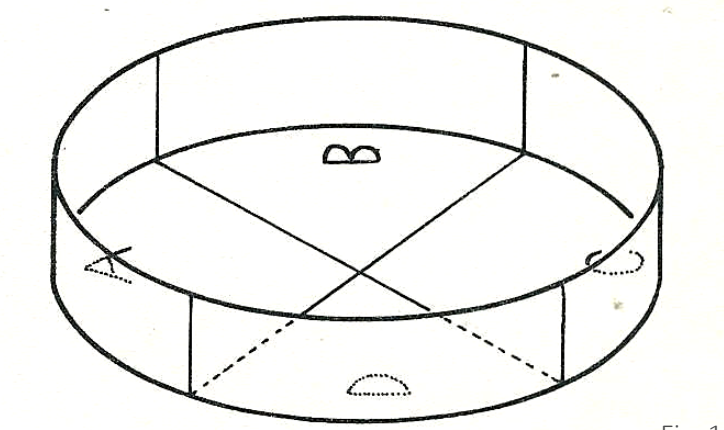

Fig. 1

2. Remove any seedlings which have fallen over or are leaning unduly.

3. Using scissors, decapitate the seedlings growing on **one half** of the cotton wool (Fig. 2) in each set.

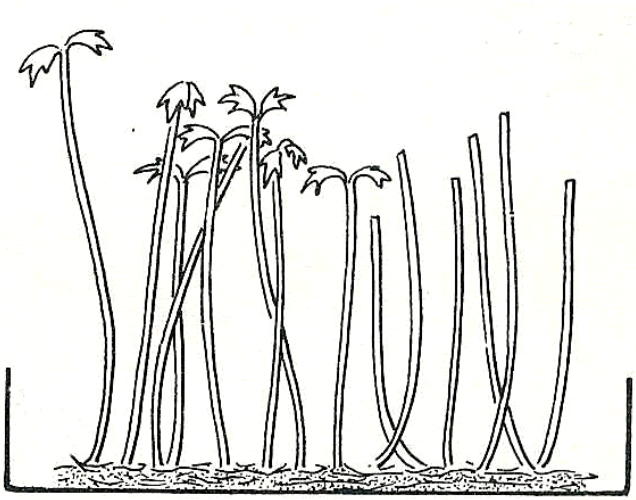

Fig. 2

4. Place the three sets as follows:

a. uncovered next to window, with intact cress nearest window

b. next to window but with cardboard shield so that light only reaches cress from one direction only. Position intact cress nearest window

c. completely in the dark.

5. Ensure each set of seedlings are watered daily for two days.

6. Rotate set a and b so that the decapitated cress is now nearest window and continue to water twice daily.

7. After two days, look at the seedlings and consider the questions overleaf.

Discussion questions:

1.Have the decapitated shoots in set a grown as much as the intact shoots?

2. How does the direction of growth differ between set a and set b?

3. How does the direction of growth differ between intact and decapitated shoots in set b?

4. Why might a decapitated shoot not change the direction of growth in set b?

Auxin is produced in the tips of shoots and moves down the shoot to stimulate cell elongation. Auxin accumulates on the shaded side of a shoot causing cell elongation to occur faster than on the lit side, causing the shoot to bend towards the light. This enables the plant to absorb more light and hence photosynthesise at a higher rate.

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