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Hands-on experiments with planaria

Planaria 'shrinkage'

Planaria can adjust their size and cell numbers by growing when feeding and degrowing when starving. Planaria undergo metabolic changes, including 'shrinkage', in response to limited food availability or unfavourable environmental conditions. During degrowth, they strategically break down their own cells to obtain essential nutrients, enabling them to sustain energy requirements and survive. This adaptive mechanism showcases their ability to efficiently recycle cellular components for optimal survival and maintenance of vital functions. This degrowth is reversible, and they can fully regrow when food becomes available.

The activity is suitable for students aged 14–19 over a period of eight weeks.

Materials (per pair of students)

- 3 planaria
- 3 Petri dishes
- Aged/dechlorinated tap water
- Plastic pipettes (3 ml) with the tips cut off
- Marker pen
- Ruler

Procedure

1. Label (A, B, and C) the Petri dishes using a marker pen.
2. Half fill the Petri dishes with dechlorinated tap water.
3. Place each planarian in a separate Petri dish (labelled A, B, and C).
4. Record the initial length and width of each planarian using the ruler.
5. Feed planarian A weekly (control). Do not feed planaria B and C.
6. Every third day, record the length and width of each planarian using the ruler.
7. After 4 weeks, start feeding the planaria with liver.
8. Every third day, record the length and width of each planarian using the ruler.
9. Calculate the percentage decrease in length of each planarian relative to their initial measurements.
10. Analyse the data and draw conclusions.

Discussion

Discuss the following questions. Sample answers can be found in the answer sheet in the supporting material.

- Explain the use of three planaria.
- What factors may influence the rate of planaria degrowth during starvation?
- How could the experiment be modified to investigate the effects of other environmental factors, such as temperature or pH, on planaria degrowth?
- What are the potential applications of studying planaria degrowth?
- How can we ensure that our scientific experiments are conducted in a responsible and ethical manner, while still advancing our understanding of biology?