



Practical 8.1 Can snails become habituated to a stimulus?



Purpose

- To investigate habituation of snails to a stimulus.

Touching snails

Lots of people, at some time in their childhood, will have touched a snail in the garden and noticed that it withdraws its eye stalks into its body. For such a slow-moving animal this seems a very quick response, this suggests it is an important response for protection and survival. A snail only withdraws into its shell when it is either inactive or threatened. When touched, it withdraws to avoid danger. Do snails become habituated to the stimulus, ceasing to withdraw with repeated stimulation? In this investigation you will collect data to find out if habituation to a touch stimulus does occur in these organisms.



Safety

Wash your hands thoroughly after touching the snails once all the equipment has been put ready for disinfection.

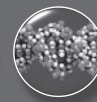
Take care that the stimulus causes no harm to the snails.

Procedure

You will need:

- One giant African land snail (or a garden snail if not available)
- One dampened cotton wool bud
- Suitable clean, firm surface for the snails (e.g. a plastic chopping board)
- Stopwatch

- 1 Collect one giant African land snail, and place it on a clean, firm surface. Allow the snail to get used to its new surroundings for a few minutes until it has fully emerged from its shell.
- 2 Dampen a cotton wool bud with water.
- 3 Firmly touch the snail between the eye stalks with the dampened cotton wool bud and immediately start the stopwatch. Measure the length of time between the touch and the snail being fully emerged from its shell once again, with its eye stalks fully extended.
- 4 Repeat the procedure in step 3 for a total of 10 touches, timing how long the snail takes to re-emerge each time.
- 5 Record your results in a suitable table.
- 6 Present your results in an appropriate graph.



Practical 8.1 (cont.) Can snails become habituated to a stimulus?

Questions

- 1 Write a hypothesis which this experiment will test.
- 2 Using your graph, state if you think there is a positive, negative, or no, correlation between the number of stimulations and the time for eye stalk withdrawal.
- 3 Explain any patterns or trends in your data, supporting your ideas with evidence from the data and your biological knowledge of habituation. Relate your findings to your hypothesis.
- 4 Suggest a reason why snails may become habituated to a prodding stimulus in the wild.
- 5 Evaluate the procedure used for this experiment.
- 6 This experiment has been shown to be less successful if the snails are handled regularly prior to the experiment. Suggest why handling prior to the experiment could affect the results of the experiment.

Going further

- 7 Write a null hypothesis that this experiment will test.
- 8 Complete a Spearman's rank r_s correlation test to determine if there is a statistically significant correlation between the variables. A table with the headings below will help.

Number of times the snail has been stimulated	Rank stimulation	Time/seconds	Rank time	Difference/D	D ²

- 9 Use a table of critical values to accept or reject your null hypothesis. If your calculated Spearman rank value (r_s) is greater than the critical value, then the null hypothesis is rejected. If your calculated r_s value is less than the critical value, then the null hypothesis is accepted.
- 10 Write a statistical conclusion for your experimental data. Make sure you include:
 - your calculated value of r_s
 - the number of pairs of data
 - the significance level
 - the critical value
 - whether the null hypothesis is being accepted or rejected.