One good turn deserves another

Turn alternation in woodlice

Most people are very familiar with the woodlouse or slater. They are found under stones, in cracks and crevices and in leaf litter in a habitat that provides them with what they need to survive. Slaters do not have very good eyesight and so they use their antennae to help them find their way around. If they find themselves in an unfavourable habitat, they need to have the ability to navigate through it and the obstacles in it to try and reach a suitable habitat. If they could not do this they may die.

Your task is to investigate slater behaviour and then try and work out how their behavioural strategy would help them survive.

This experiment will investigate the following –

If a Slater is forced to make a turn, at its next turn does it turn in the same (S) or opposite (O) direction?

Materials

- 'T' maze, with little 'alley' blocks and lid
- 40 slaters in tub.
- Paint brush
- Spoon
- Cotton buds
- Distilled water to clean out maze between runs.
- Small pots with magnifying lid.

Method

Experiment 1.

What does a Slater do next when it is forced to turn in one direction?

1. Place alley blocks at F and G. This will mean your slater will be forced to make a right turn.
2. *Start each Slater at D by carefully transferring them into the maze using the fine brush. Cover the maze with the clear cover and watch what the Slater does at junction B.* ***N.B. Make sure each slater walks along the floor of the maze, discount any that walk sideways along the edge.***
3. Record whether the Slater turns in the same (S) or opposite (O) direction to the first, forced turn.
4. Once the Slater has completed the turn, carefully remove it from the maze and place it into the 'completed experiment' tub.
5. Before you put the next animal into the maze, clean out the alley with a cotton bud and water to remove any scent trails etc that the animals may follow.
6. Run the experiment with 40 animals, using each animal ONCE only.
7. Do not use any damaged animals with missing antennae, or any very large or small slaters. Try to use animals that are similar in size.
8. Add up your results to see how many slaters turned in the same (S) or opposite (O) direction to the forced turn and go on to analyse your results.

Analysis of results

If the number of same (S) and the number of opposite (O) turns are equal then you can conclude that they choice of turn is random and there appears to be no link between the forced turn and the turn direction at the next point of choice.

The Binomial statistical test can be used to test the probability of the forced turn having no effect on the subsequent turn, and if it is less than 5 % then the results are significant at the 5 % level. Add up the S's and the O's and if the smaller of the two figures is less than or equal to the figure in the table below, the results are significant:

Number of isopods tested	Critical value of smaller total
40	13
39	12
38	12
37	12
36	11
35	11

Conclusions

What did you find out? How can the behaviour of the Slater help it survive in its environment? Could this help it survive in an unfavourable environment?

You may want to go on and try some more experiments –

Experiment 2.

How good is a slater's memory?
If the slater's last turn does have an effect on the next turn, how long does their memory last? This can be tested by repeating expt. 1, but by creating a much longer time between the forced turn and the next turn. Block the side turnings at IK and HD, and start the animals at N or L. This gives them a long walk to the next point where they can choose, at junction B. If there is still a bias, then you may want to try experiment 3.

Experiment 3.

How long is a slater's memory? Is it the goldfish of the isopod world?
This time, repeat experiment 2, but put in blocks between M and J and stop the Slater for 10 seconds, before letting it continue on its journey. This can be repeated with longer stopping times to investigate this fully.

This version of turn alternation in woodlice follows the protocol given in –

Opernshaw, P 'What the isopod did next', from Biology Ideas and Experiments, Edited by Darlington, H, Bello, J.W. Published by ASE (2010)

There are many versions of this experiment and it has lots of potential to be developed for advanced higher project work. See below for more information and ideas.

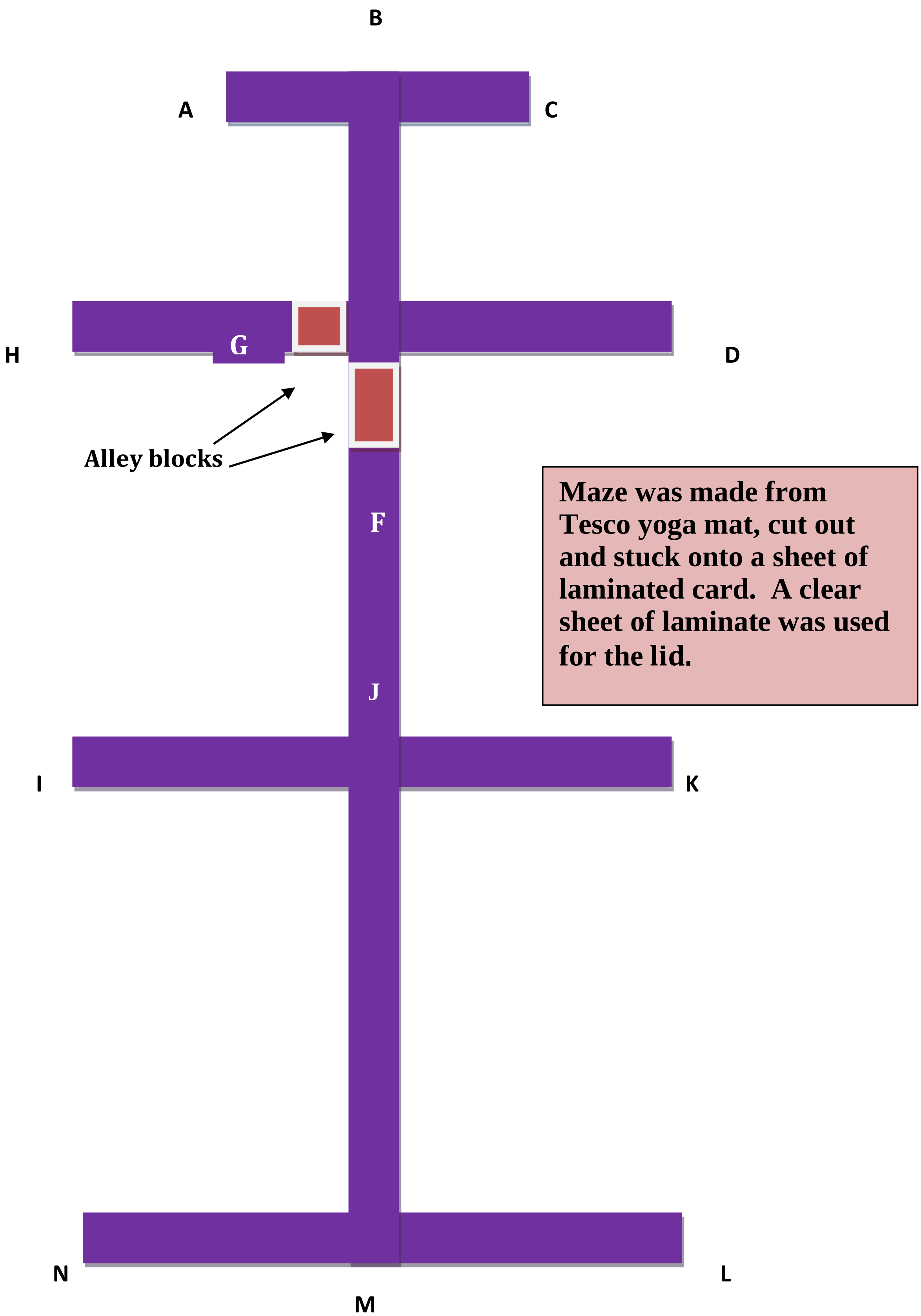
References

http://asab.icapb.ed.ac.uk/practicals/woodlice_turning.html

http://www.practicalbiology.org

Hughes, R N (1967). Turn alternation in woodlice (Porcellio scaber), Animals Behaviour, 19, 353-6.

Diagram of maze



Alley width = 75 mm. AC = 50 mm, DH = 75 mm, BM = 200mm. Distances are not critical.