# Guidance for Option A – Practical 1

## *Taxis in flour beetles*

### Safety

Although great care has been taken in checking the accuracy of the information provided in this guidance, Cambridge University Press shall not be responsible for any errors, omissions or inaccuracies.

Teachers and technicians should always follow their school and departmental safety policies. You must ensure that you consult your employer’s model risk assessments and modify them as appropriate to meet local circumstances before starting any practical work. Risk assessments will depend on your own skills and experience, the skills and experience of your students, and the facilities available to you. Everyone has a responsibility for his or her own safety and for the safety of others. The notes below should not be regarded as a risk assessment.

You should carry out the practical yourself before presenting it to students. Make sure you are comfortable with the procedures, and can anticipate any difficulties any of your students may encounter.

### Guidance

Taxis and kinesis are two important innate behaviours that are easy to demonstrate for small insects and other invertebrates. This experiment can easily be conducted in the lab, and expanded to cover the use of statistics if appropriate.

### Apparatus and materials

Each student or pair will need:

• a choice chamber, with divider and gauze • small paintbrush

• calcium chloride granules (a drying agent) • desk lamp

• spoon or large spatula • black fabric or paper

• tissue paper • additional clean Petri dishes and lids

• culture of flour beetles (*Tribolium* sp.) • stopwatch  
or other suitable small invertebrates,   
such as woodlice

### Setting up the practical

The cultures of invertebrates can be shared by the members of the class. Each student or pair will need only a few insects. Calcium chloride (anhydrous) should be supplied with a large spoon or similar so that students can take sufficient from the container without it coming into contact with their skin.

### Supporting the practical

Students should be reminded to handle living organisms carefully. A paintbrush is suggested to pick up flour beetles. It is important that flour is not put into the choice chamber with the beetles as this may affect their behaviour.

Some background information on the life history of the flour beetle (or other species used) will help students relate their findings to the conditions which adults and larvae require so they can relate behaviour to survival chances.

### Clearing up

Living organisms should be carefully returned to their cultures.

To dispose of calcium chloride, dilute to less than 100 g in 1000 cm³ water and pour into a foul-water drain.

### Answers to questions

These answers relate to flour beetles and will be different for different species.

**1** Flour beetles prefer dry, dark conditions. Adults live in stored grain (which is kept dark and dry, to prevent germination), into which they burrow to lay their eggs.

**2** Movement towards dry conditions helps the beetles avoid damp grain, which is likely to be mouldy and not provide a good food source. Beetles are also more likely to find a mate in these favoured dry, dark conditions, as well as a suitable place to lay their eggs.

**3** The chi-squared test should show that beetles have a significant preference for dry and dark conditions.

**4** Suggestions for improvements might include using a larger numbers of individuals, checking that all individuals are the same age, making accurate measurements of humidity and light using probes and data-loggers.