

Tree Slugs

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◆GENERATING IDEAS◆

WHEN teaching statistics at any level you are faced with the problem of thinking of original projects. Perhaps all your thirty students will want to do different things according to interests. Syllabuses are full of one-line suggestions which are intended to be helpful but often do not suggest any real project aim. Below is a project outline which goes beyond the brief 'traffic survey' or 'investigation into heights and weights' so often quoted as examples in syllabuses. Moderators, I am told, do become very tired of yet more bar charts of colours of cars passing, or tables of football results. I am fairly sure this idea will not lead to a plethora of tree slug projects since these charming molluscs are fairly localised in their occurrence in the British Isles. I do hope, however, that the general outline will be of assistance in developing your students' project outlines beyond the trivial and aimless 'investigation into TV viewing habits'. This article is not about a project which has been done, but about one which could be done. It tries to give an idea of what might happen and how to advise students to pursue their ideas.

◆BACKGROUND KNOWLEDGE◆

Perhaps you should know that tree slugs (*Limax*



marginatus) live in damp woodland and are the only slugs which regularly climb trees. Except when the weather is wet, any slug trails on tree trunks will be those of tree slugs. It can be difficult to observe the slugs directly as they are most active at night. By day they roost under bark, in holes in trees or under debris on the ground. Projects based on tree slugs (or indeed most other slugs) are best undertaken during the autumn term when they are at their most active. Kerney and Cameron (1979) give more details of identification and habits.

◆PROJECT TITLE◆

Do tree slugs prefer particular species of tree? Notice the very specific project title - it is far better than 'An investigation into tree slugs' because it tells us (and the student!) what is to be done.

◆ANALYSIS AND COLLECTION OF DATA

This sub-heading is deliberate. You will certainly collect your data before you analyse them, but it is vital that you plan your analysis before you collect data. If you do not, you may find your data are not amenable to analysis.

A possible approach is to go to deciduous woodland where these slugs occur, look at as many trees as possible and record presence or absence of slug trails. A simple analysis is possible with a chi-squared test on an $n \times 2$ contingency table.

Tree	Trails	No trails
Oak		
Ash		
Sycamore		
.....		

◆PROJECT REPORT ◆

A worthwhile project will include a relatively large amount of discussion about the efficiency of the sampling and observation methods adopted and practical considerations in ensuring representative findings. There are already opportunities here for a good deal of creditworthy statistical work. Here are some points which could be discussed.

How should we select trees? We could take a line transect, or perhaps select a number of points (randomly or on a grid system?) looking at all trees within 10 inches of the chosen points. Are there any viable alternatives?

What constitutes a tree rather than a shrub? Perhaps "circumference at 1 m above ground level greater than some specified value" could be used.

Should we look at all trees or have a quota of each species.

Are all people equally good at finding slug trails? If two or more people carry out the observations, do they all work equally effectively? Should we consider observer training before collecting the project data?

Are trails equally easy to see on all types of tree? How could you find out, and what would you do if they were not?

Should we measure on a finer scale than just presence and absence of trails? We could use, perhaps, 'no trails', a few trails' and 'many trails'? What benefits and problems would such a scale bring'?

What graphical representation will be used (and why)? There is already enough material here to provide an A* grade project for a good GCSE student. There is no reason why able students should not be told how to use chi-squared tests or similar in order to decide whether or not to reject hypotheses - don't let GCSE syllabuses restrict the education process!

◆EXTENSIONS ◆

What about the A-level student? Two things may happen. First, things may go very badly with everything going wrong. (Incidentally, going wrong is not necessarily synonymous with a non-significant result!) In this case, review the work, assessing what has failed.

All this review will be very credit-worthy. Using this valuable experience, re-plan the operation so that this time it works.

The second possible outcome is that your question will be answered with a 'yes' or 'no'. For A-level, so far, we may have done a sound pilot project only. The student will have noticed many things about tree slug ecology and should be in a position to formulate a worthwhile question to attack for the main work. Tree slugs will either have tree species preferences or not. If they do not, further work could be done to try and explain why they occur where they do. (Age of tree? Density of shrub layer? Nearness to edge of wood? If they are found to have preferences, further work should be aimed at explaining why these preferences might occur.

Is it the roughness of the bark which is the key to the species preference? An index of bark roughness could be derived for different tree species. It would then perhaps be possible to correlate the proportion of trees with slugs with values of this roughness index.

Perhaps different tree species have different amounts of lichen on which the slugs graze? Do tree slugs prefer trees with more lichen? Perhaps tree slugs appear to have preferences for particular species of tree, but in fact both trees and tree slugs have preferences for the same soil conditions. Thus the association between slug and tree could be a result of some other factor.

Perhaps observation data for the original experiment suggested different patterns of tree use in different areas. Are tree slugs more abundant in wetter parts of a woodland?

Do tree slugs tend to use one side of trees more than another and if so does this preference depend on tree species? Again, this might result from experience of searching for trails.

◆PROJECTS ◆ FOR YOUR STUDENTS

Now it's your turn. Tree slugs may not be particularly appealing to you, or they may not be found in your area. Rethink this article replacing 'tree slug' with earwig, redhead, yuppy and replacing 'tree species' by variety of dahlia, colour of clothes, type of sandwich or any other suitable words of your choice. Let us know how your students cope with these suggestions.

Reference

Kemey M. P. and Cameron R. A. D.(1979). *A Field Guide to Land Snails of Britain and North-west Europe*. Collins.