



Advanced Higher Biology project: supporting candidates with planning

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Introduction

This document is for teachers and lecturers.

The table below offers a limited list of suggestions for low-cost Advanced Higher Biology projects.

The 'Suggested questions for candidates' column provides questions you could ask candidates to help their planning.

You are responsible for deciding if a candidate's proposed project is suitable and for carrying out a risk assessment.

List of topics with suggested questions for candidates

Topic	Comments	Suggested questions for candidates
Pollution — 1 Effects of environmental pollutants on the growth of aquatic plants	<p>Suitable pollutants could be detergents, fertiliser (as in runoff from fields).</p> <p>Various freshwater algae and duckweed (<i>Lemna spp.</i>) make excellent fast-growing test organisms.</p>	<ul style="list-style-type: none"> ◆ How could you measure the growth of algae in a liquid culture? ◆ How could you measure the growth (rate) of duckweed? ◆ Which concentrations of 'pollutants' would match those found in the environment?
Pollution — 2 Effects of environmental pollutants on <i>Daphnia magna</i> heart rate	<p><i>Daphnia</i> are proven to be useful in measuring ecotoxicity as their heart rate responds to toxins.</p>	<ul style="list-style-type: none"> ◆ How could you accurately count a <i>Daphnia</i> heart rate of 200+ bpm? ◆ What are the ethics of working with <i>Daphnia</i>? ◆ What other data do you need to measure the effects of treatments?
Pollution — 3 Effect of 'acid rain' on seedling germination or growth	<p>Although pollutants that cause acid rain have been reduced in Western countries it is still a problem in other countries such as India and China.</p>	<ul style="list-style-type: none"> ◆ What might be the effects of acid rain on seedling germination or growth? ◆ How will you measure plant growth? ◆ What might be the most susceptible or appropriate plants to use? ◆ How will you apply the 'acid rain' to the seedlings?

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<p>Turn alternation Mechanism of turn alternation or correction in woodlice</p>	<p>Woodlice (various species in UK) show turn alternation or correction following presentation with a forced turn. Research suggests that 'bilaterally asymmetrical leg movements' may cause this.</p>	<ul style="list-style-type: none"> ◆ Why is such a mechanism important to woodlouse survival? ◆ Can you obtain sufficient numbers of woodlice? ◆ How could you measure the strength of response? ◆ How could you determine the effect of increasing the number of forced turns on the strength of response? ◆ How could you determine the effect of increasing the length of time or distance of travel after the forced turn on the strength of the response?
<p>Phototaxis — 1 Phototaxis in <i>Daphnia magna</i> in response to differing wavelengths of light</p>	<p><i>Daphnia</i> are algae feeders, able to detect light. Movement towards light brings them closer to the surface where algae are.</p>	<ul style="list-style-type: none"> ◆ How would you determine the response to different wavelengths of light? ◆ Is there another variable that you must control when varying wavelength? ◆ Can you maintain a sufficiently large stock culture of <i>Daphnia</i>?
<p>Phototaxis — 2 Phototaxis in maggots in response to differing wavelengths of light</p>	<p>Housefly (<i>Musca domestica</i>) maggots move away from light.</p>	<ul style="list-style-type: none"> ◆ Do you have a source of maggots? ◆ Can you maintain a culture of maggots? ◆ How will you measure their response to light? ◆ How can you determine whether wavelength is critical? ◆ Is there another variable that you must control when varying wavelength?

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<p>Enzymes — 1 Preventing enzymatic browning in prepared fruits</p>	<p>Many supermarkets sell sliced or chopped fruits for convenience. Methods are needed to slow some fruits from browning.</p>	<ul style="list-style-type: none"> ◆ What is the cause of enzymatic browning? ◆ How might you obtain an extract of this enzyme from fruit? ◆ What method(s) could you use to measure the rate of browning? ◆ How might you slow the reaction?
<p>Enzymes — 2 Optimum conditions for catalases from different sources</p>	<p>Catalase enzyme is present in the cells of most higher organisms. Many organisms have different body temperatures and metabolisms.</p>	<ul style="list-style-type: none"> ◆ What is the action of catalase and its function in the body? ◆ How can you measure the rate of catalase action? ◆ Which organisms are suitable sources of catalase? ◆ How might you determine the optimum conditions for different catalases?
<p>Allelopathy Inhibition of seed germination or growth of other plants by plants such as <i>Pinus</i> or <i>Rhododendron</i></p>	<p>Many plants exhibit allelopathy — the production of chemicals to inhibit the growth of plants around them.</p> <p>Rhododendrons are introduced, exotic species. They are a problem as they inhibit the growth of native plants under or near them.</p> <p>Pine trees also appear to inhibit the growth of many plants below them, even though there is adequate light.</p>	<ul style="list-style-type: none"> ◆ How will you measure plant germination or growth? ◆ How could you show any inhibition is due to chemicals being produced by the allelopathic plant? ◆ How could you collect different extract samples to test this? ◆ What might be an appropriate plant species to test extracts on?