

From Bugs to Big Beasties and Other Queries- some answers to frequent and not-so-frequent questions in Biology

SSERC receives many enquiries as to which activities are permissible in a school within Health and Safety Guidelines. This article aims to highlight some of the common and not-so-common Biology related enquiries we have received over recent months.

To use or not to use?

The use of animal material in school can be of considerable educational value and a range of material is available and suitable for this purpose. In so using animal material, care should be exercised regarding the sensitivity of pupils towards its use.

Pupils should understand the educational objectives of using such material and be aware of the consequences of its use to the species involved and of its impact on the environment.

This is also an area where there are currently well-publicised, rather than necessarily well-understood, hazards. In a number of cases these dangers are theoretical rather than significant in terms of the actual, practical risks. In taking the necessary steps to control any risks and in explaining these clearly to pupils and students much additional educational value can be obtained.

To dissect or not to dissect?

A number of urban myths surrounding the dissection of animal material continue to 'float around'. These contribute to confusion and we receive enquiries about various aspects of dissection on a regular basis from both teachers and technicians. Many of these simply ask: 'What are we allowed to do?' Our answer is that dissection of animal material is permitted so long as it is obtained from animals that have been slaughtered for human consumption. Such material may be obtained from butchers and, on occasion, abattoirs. The dissection materials must be fresh or, if they have been frozen, recently defrosted.

A significant number of enquiries relate to the potential use of eyes and brains, with particular concerns over the possibility of their harbouring agents that cause spongiform encephalopathies (*e.g.* BSE). Again, organs from animals prepared for human consumption may be used for educational purposes. Such animals are deemed to be safe when slaughtered within the prescribed age limit of six months for cattle and twelve months for sheep and goats.

How to clean dissection instruments.....

Instruments used for dissection purposes should be cleaned thoroughly using hot water and detergent. It is also preferable to sterilise them by autoclaving before their next use. Where appropriate, the use of dissection scissors would be preferable to using surgical scalpels. The advantages of this are twofold: using scissors reduces the incidence of accidental cuts, and also takes away the need for disposal of used scalpel blades.

....and how to dispose of the animal remains?

In the absence of any specific, local arrangements for specialist collection and disposal, small quantities of waste from dissected animal materials should be double-bagged in opaque polythene bags, and disposed of via the local authority refuse collection and disposal system.

Are pupils allowed to sample their cheek cells?

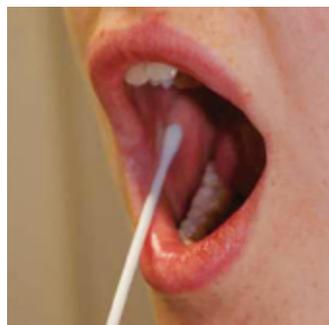


Figure 1 - Sampling cheek cells

Our answer to this is a resounding 'Yes'! What could be more fascinating than looking at your own body cells or extracting your own DNA? In our experience, such practical work both stimulates and engages pupils and has significant educational value. In carrying out this practical work, pupils do have to observe certain preventative and protective measures and the consideration of these, in itself, can have significant value.

In order to prevent any possibility of cross-infection, pupils should collect and prepare only their own cells. Once they have taken their samples (by rubbing the inside of their cheek with a cotton bud or similar – *see Figure 1*), pupils must immediately discard the transfer implement into disinfectant, either 1% chlorine bleach or Virkon™.

On completion of the activity, slides and coverslips must also be transferred to the disinfectant, where they should remain for at least 24 hours. Teachers or technicians can then remove these for thorough washing and re-use. Disinfected cotton buds should be placed in a polythene bag, sealed and disposed of through the local authority refuse disposal system.

...and use their own saliva?



Figure 2

Saliva was traditionally used to demonstrate the action of the enzyme salivary amylase, which converts starch to maltose (*Figure 2*). With the recognition that viruses can reside in body fluids, uncertainty arose as to whether the collection and use of saliva from pupils was permissible under Health and Safety legislation. Whilst alternatives to salivary amylase are commercially available as

liquid and powdered bacterial amylase these also have a number of disadvantages: they are more expensive; the use of powdered enzyme requires further preparation; and neither readily demonstrates a link with living organisms.

Saliva therefore has several advantages and it can be used to carry out interesting and valuable practical work so long as pupils observe the appropriate preventative measure by collecting and using only their own saliva. All apparatus in contact with saliva should be disinfected for at least 24 hours in either 1% bleach or Virkon™ and then thoroughly washed before re-use.



Figure 3

Can blood samples be taken from pupils?

SSERC personnel regularly receive enquiries as to whether it is permissible to take blood samples from pupils, with the purpose of testing blood glucose levels (Figure 3) or determining blood groups using Eldon cards.

The latest guidance from UK Government Departments outwith Scotland does not completely rule out the taking of human blood samples in schools and colleges, although it is not encouraged; it is for the employer to give approval. For such approval to be granted, a teacher must be able to justify the procedure on educational grounds and demonstrate that they can ensure safety at all times.

Safety here is heavily dependent on administrative controls (with all pupils following each instruction to the letter) and employers may be reluctant to grant approval. Under no circumstances should pupils be given this activity to carry out at home.

I have been told that I cannot take swabs from classroom surfaces in order to inoculate plates. Is this true?

Microbiology is another area that provides wonderful opportunities for practical work that engages and stimulates. Pupils keenly anticipate and are excited to see what has grown on plates they have inoculated from the swabs they have taken (Figure 4). Such work can provide very positive educational experiences and can be safely carried out provided that simple preventative and protective measures are observed. Common sense should be applied to selecting the 'test' area; for example, pupils should not swab areas such as toilets. Other common sense measures include: using the swab to inoculate only solid medium before being discarded into disinfectant; growing micro-organisms on solid medium within a petri dish so the operation is small scale and, by taping the dish¹ and not re-opening, the microorganisms are contained;

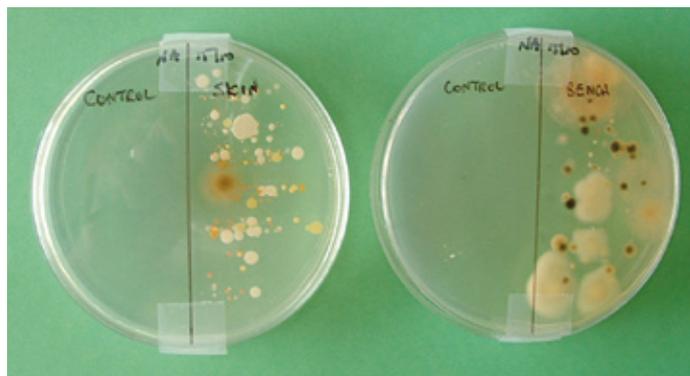


Figure 4

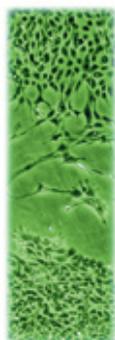
incubating at a temperature of no more than 30°C to discourage growth of pathogens. Finally, after examination, plates should be autoclaved before bagging and disposal with normal waste.

An Advanced Higher student would like to carry out a chemical analysis of dog urine. Is this allowed?

Sampling, analysis and use of **human** urine for educational applications is not routine at school level, but can be carried out at the post-16 level as part of project work. Such investigations should involve specific risk assessments being carried out and the work undertaken with appropriate supervision.

There does not appear to be any restriction on the use of animal urine for project work. However, major concerns here are how the urine would be sampled and also how it would then be stored for testing. Urine provides a good nutrient medium for bacterial growth, and so it would need to be stored at low temperatures for short periods of time and disposed of by flushing down the toilet, with all containers being sterilised afterwards. A full risk assessment of the activity would need to be carried out prior to the investigation. If the investigation were to be undertaken by a pupil in a medical/veterinary facility, the host institution would be responsible for carrying out the risk assessment and providing specialist supervision.

¹The petri dish should only be taped diametrically. If completely taped and sealed, this may encourage the growth of anaerobic bacteria.



Where can I find information on microbiological and other biological safety issues?

The advice provided in the foregoing article, and much more, is provided in two documents available on the SSERC website and on the SafetyNet CD to SSERC members. The documents are:

Materials of Living Origin: a code of practice for Scottish schools

http://www.sserc.org.uk/members/SafetyNet/Biology/MOLO/Main_Menu.HTM

Safety in Microbiology: a code of practice for Scottish schools and colleges

http://www.sserc.org.uk/members/SafetyNet/Microbio2/Main_Menu.HTM

Besides e-mailing or telephoning SSERC for help with these issues, the SSERC website (www.sserc.org.uk) contains lots of useful information as well as downloadable copies of the documents mentioned above.

The other 'must-have' publication containing advice on Health and Safety matters is:

Topics in Safety 3rd Edition, The Association for Science Education (2001).