SSR

March 2020
volume 101 number 376

Science, engineering and big questions

Special coronavirus discussion inside

The Association for Science Education

School Science Review

The ASE's journal for science education 11–19

FSC A level biology fieldwork

www.field-studies-council.org/alevelbiology

Up to **5** named practicals ticked off*

All **5** practical endorsement criteria assessed

3 stats tests taught

3 different ecosystems studied

36 hours of teaching

Just **5** days off the school timetable

FSC

Field Studies Council, FSC, is an environmental education charity providing informative and enjoyable opportunities for people of all ages and abilities to discover, explore, and understand the environment

*Actual course content will vary per specification

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The Association for Science Education

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Health & Safety

For all practical procedures described in *SSR*, we have attempted to ensure that:
- all recognised hazards have been identified;
- appropriate precautions are suggested;
- where possible procedures are in accordance with commonly adopted model risk assessments;
- if a special risk assessment is likely to be necessary this is highlighted.

However errors and omissions can be made, and employers may have adopted different standards. Therefore, before any practical activity, teachers should always check their employer's assessment. Any local rules issued by their employer must be obeyed, whatever is recommended in *SSR*.

Unless the context dictates otherwise it is assumed that:
- practical work is conducted in a properly equipped laboratory;
- any mains-operated and other equipment is properly maintained;
- any fume cupboard operates at least to the standard of CLEAPSS Guide G9;
- care is taken with normal laboratory operations such as heating substances or handling heavy objects;
- good laboratory practice is observed when chemicals or living organisms are handled;
- eye protection is worn whenever there is any recognised risk to the eyes;
- fieldwork takes account of any guidelines issued by the employer;
- pupils are taught safe techniques for such activities as heating chemicals or smelling them, and for handling microorganisms.

Readers requiring further guidance are referred to:
Hazcards (CLEAPSS, 2016 and updates)
Topics in Safety, 3rd edn (ASE, 2001); updates available at www.ase.org.uk/resources/topics-in-safety
Safeguards in the School Laboratory, 12th edn (ASE, 2020)
Preparing Risk Assessments for Chemistry Project Work in Schools & Colleges (SSERC, 2020)
SSERC hazardous chemicals database (www.sserc.org.uk/health-safety/chemistry-health-safety/hazchem_database-2/)
Be Safe! Health and Safety in School Science and Technology for Teachers of 3- to 12-Year-olds, 4th edn (ASE, 2011)

Editorial Board and Associates

Contributing to *SSR*

We welcome contributions for all sections of *School Science Review*. For reference, a full page of A4 text in the journal is about 800–850 words; including two small figures on a page would bring that down to about 600 words.

These can be emailed to The Editor, ssreditor@ase.org.uk, or posted to The Editor, *School Science Review*, ASE, College Lane, Hatfield, Herts AL10 9AA. Detailed advice on the submission of articles and Science notes is available on the ASE website at: www.ase.org.uk/content/submission-guidelines.

Editorial

I remember being taught in junior school about the bubonic plague pandemic known as the Black Death that occurred in the mid 14th century. It had originated in China and reached Europe in under a year, when the fastest transport on land was by horse or by sailing ships on the sea, and very few people travelled great distances. It had arrived in Venice via the Black Sea (which perhaps explains the name 'Black Death') and, once the problem was recognised, the Venetians made sailors stay on their ships for 30 days, later extended to 40 days, to prove that they had no illness. The Italian for 40 days gave us the term 'quarantine'.

Then in 1665, there was the Great Plague, yet another outbreak of bubonic plague. It was brought to London in cargo on sailing ships. A tailor in Eyam, Derbyshire, had ordered a roll of imported cloth from one of those ships. Fleas in the cloth spread the disease and many people became ill. Some of the villagers suggested that they should go to live in the nearby city of Sheffield for safety, but the priest persuaded them not to do this as he feared that they would spread the plague into the city and throughout the north of England, which had so far escaped the worst of it. Eyam was kept supplied with food by people who lived outside the village. They brought supplies and left them at the parish stones that marked the boundary of Eyam. The villagers left money in a water trough filled with vinegar to sterilise the coins. Eyam was not left to starve to death. Those who supplied the food did not make close contact with the villagers. This was the original 'self-isolation'. By November 1666, the plague was considered to be at an end. 260 out of 350 had died in the village but their sacrifice may well have saved many thousands of lives.

Transport evolved to railways, motor vehicles and aircraft. Compared with former times, we are surrounded by electrically operated items. We have electric cookers rather than coal ovens, while televisions and mobile phones put us in contact with almost the entire world. So much easier than in the past! No doubt we have all felt the limiting effect of the social distancing required owing to coronavirus, but imagine how we would cope without our modern aids.

School Science Review was established to report on things that people had done in schools and the viability of the content is always checked. It is not a news magazine; and that means content could be out of date before it is printed but we believe that is not usually the case. However, the coronavirus outbreak has had such an impact on education (no school for 2 months or more, and cancelled examinations) and on life in general that we have broken with tradition and attempted to produce some useful information for teachers. It takes the form of a discussion between me and Neil Walker. It is not expert opinion. The internet is bursting with that, but it has to be sought and studied carefully.

In our traditional content, we open with three *Science notes*. Chris Talbot explains some of the problems in drying gases after chemical reactions have taken place in water. But what if the gas reacts with the drying agent? The modern aids mentioned above (and many others) all need a supply of energy, and the electric current has to pass through cables; good conductors that can never be perfect! Overheating can be a consequence, leading to damage or a fire. Ping-Wai Kwok describes a demonstration to illustrate this to students. It is suitable for all age groups. A simple electronic project to use as a regular teaching aid is described by Steven Weir. He notes that practical work often takes longer than anticipated.

The cover picture indicates that this edition contains a theme section. It is the fourth led by Berry Billingsley in under 4 years and it has a more practical approach, taking us towards applications of engineering from science education. Berry explains more fully on p. 16.

During the course of last year, we included some accounts of presentations at the ASE Annual Conference held in January 2019. One from Jan Höper in Norway could not be fitted in earlier and is thus included here. It describes a very new technique that makes use of infrared radiation to identify substances – a physics technique applied to chemistry! It can save hours of chemical analysis.

A collaboration article features a study by a group of students from Belmont Community School, Durham, led by Pen-Yuang Hsing from Durham University that also makes use of infrared imaging, in this case to observe the behaviour of animals at night. The project was supported by teachers and other advisers.

Infrared also features in an article from Choun Pei Wong and R. Subramaniam in Singapore. Here, thermal imaging is used to illustrate features of physics, chemistry and biology.

This arrival of articles from such diverse sources that all feature infrared radiation was a coincidence, which suggests that such techniques are likely to become more popular in the future.

Finally, David Fairley from Singapore describes a computer method of modelling how chemical reactions occur.

Geoff Auty
Editor, *School Science Review*