

Practical work II

Michael J. Reiss, *Special Issue Editor*

This issue of *School Science Review* contains the remainder of the articles on practical work for the special issue on practical work that is spread over the June and September 2015 issues. The articles in the June issue concentrated on matters that are key to practical work, especially as such work is undertaken in the school laboratory. The articles in this September issue look at how the quality of school practical work can be enhanced, whether by extension activities in the laboratory or by activities that can be undertaken outside of the science classroom or laboratory.

Gary Williams, Mariana Salgueiro and Eric Coombes focus on the rocket and dragster launcher make-and-take workshops that the Institute of Physics Teacher Network has run for some years. They sketch out the origin and development of the workshops, how they have spread the original idea and how that idea has developed and the design of the launcher changed. The whole is presented as an example of how the right sort of 'one-shot' professional development sessions can have a widespread impact through a centrally coordinated network of local support.

Dave Colthurst, Becky Parker and eleven of their sixth-form students reveal the contribution that school students can make to the scientific community if there are opportunities for them to take part in authentic science research. Two very different research projects are outlined to give a taste of the biomedical research and particle physics research carried out at a state school in Kent. Evidence from the school and its partner schools shows that the approach is inspirational for students and teachers alike.

There has been a long history of charities working to improve school practical work and Dan Jenkins of SAPS (Science and Plants for Schools) argues that an understanding of the science of plants is of importance in enabling humanity to meet the ever-increasing demands on our global resources. Jenkins provides examples of resources to overcome the apathy that many

students show towards plants. Opportunities to reposition plant material in the school science lesson are suggested and the usefulness of plant material in practical science considered.

The final group of articles looks at the potential for learning outside the science classroom or laboratory. Justin Dillon takes the view that practical activities in which students interact with materials or with secondary sources of data to observe and understand the natural world provide valuable learning experiences. He demonstrates how and why science can be taught effectively outside the laboratory and gives examples of successful projects involving schools, museums, science centres and botanic gardens in the UK and elsewhere.

Kenny Webster describes how science museums and science centres approach the use of practical activities and workshops to engage students with not only their collections and exhibits but also contemporary science and indeed science communication itself. Webster argues that, through the use of exploration, active participation and high-impact learning programmes, these organisations can positively change attitudes towards science careers, both directly by their impact on the students and by increasing science capital within families. He exemplifies his points by showing how the Science Museum in London is working with academic partners to measure this engagement with a view to applying the findings to its existing programmes.

Using the Natural History Museum in London as a case study, Martin Lawrence and Abigail Tinkler argue that, while a traditional view of science museums is that they present a static image of science (i.e. a fixed body of knowledge largely beyond doubt or dispute), things have changed significantly in recent years. They show that there are now many opportunities for students to learn about the various processes of doing science, to engage directly with scientists and their work, and to contribute to real scientific

activities through citizen science research projects in a variety of contexts.

Dean Veall highlights how the Grant Museum of Zoology and Comparative Anatomy, University College London's (UCL) teaching collection of zoology, uses its collection to support inquiry-led science learning. The schools programme at the museum engages pupils in a process of active research or inquiry that builds their understanding of a subject. Veall shows how this approach reflects the practices of researchers at UCL. He maintains that adopting this approach to learning programmes for schools helps to connect the research and practices of UCL with schools and provides meaningful experience for pupils that supports teachers' delivery of the National Curriculum.

Finally, Melissa Glackin, Susan Leigh, Gillian Jonusas and Jo Mercer examine in detail the science that can be learnt by studying one species in the field. The oak processionary moth is a non-native species that has been identified relatively recently in southeast England. Owing to the potential health risks for humans and oak trees, methods are currently being developed to control the species. However, controlling the species is challenging, requiring risk management of both biodiversity and public health. Their article describes the moth's life cycle, related health risks and issues concerning methods of management. Two examples are presented of how these issues might be utilised when teaching secondary school biology. Ideas from the developed lessons are also applicable to other 'managed' non-native species.

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