

FOCUS ON...



The wonderful Bunsen burner

My first lesson at grammar school was 'The parts of the Bunsen burner' (I still have the notebook to prove it). Almost 50 years later, asking PGCE students about their first science lesson, most of them said the same thing. So the Bunsen burner (along with the Wheatstone bridge, Kipps' apparatus, burettes, retort stands, litmus paper, lime water, etc.) is one of those things we never encounter outside a school laboratory. Yet despite this, they somehow retain that aura of what science is about – or as Guy Claxton called it, the science of 'Labland'.

So is this 'real' science? Children obviously love the paraphernalia of science – the labcoats, protective glasses, microscopes, chromatograms, datalogging and other specialist apparatus – and they love meeting real scientists and engineers, as the articles in this issue from **ChemLabs** and **Colin Press** show. And if this promotes understanding of what real scientists actually do (as opposed to the wacky comic-book image of Einstein look-alikes making bubbling potions and explosions in Frankenstein-style basements) it can only be a good thing.

They can't all be scientists

On the other hand, the purpose of science in schools cannot simply be to turn all children into aspiring professional scientists, just as they can't all be airline pilots, fashion designers or professional footballers. School science has to be much more about helping younger children especially to think scientifically about matters occurring in their daily lives, which is where the 'real' bit comes in. No point in presenting science as all flashes and bangs: apart from on November 5th, we don't go round creating explosions. It makes much more sense to learn the really useful skill of how to put out a chip-pan fire safely – why the cloth needs to be damp not dry.

In the same way, there's little point in children separating iron filings from sulphur with a magnet – a nice trick, but of little practical use. Better to challenge them to sort a bag of muesli into its components, to find out what you are eating, or to get the iron back from a box of *Special K* – which I once thought impossible, but is really amazingly easy! And why tell them that most substances are either solid, liquid or gas, when most of the things they come across at home are

powders, pastes, creams, gels, mousses, syrups, foams or sprays? Let them investigate real things, and decide how to classify them.

So what is 'real' science?

'Real' science, for us, is about understanding the science behind real things: events, phenomena, behaviour and (especially) life around us, the things that arise all the time in the day-to-day experiences of children. All children have seen a rainbow, and it is certainly not easy to explain one to young children; so why not ask them next time they see one, what makes a rainbow? Start from their own observations and explanations – as one child said, *'it's wet petrol gone up into the sky'* – and help them develop their observational skills. Does your rainbow have an end? When do you get a rainbow? Where does it seem to be? Which way do you have to look to see it? Does the sun have to be shining? Does it stay put when you walk towards it? Why are there sometimes two rainbows? Are they the same? Which colours are on the inside, and which on the outside? Why can you sometimes see a rainbow when watering the garden, or flying above the clouds? How might you study this?

Staying with natural phenomena, we know old people who are terrified of electrical storms to such an extent that they either scurry for cover anywhere underground, or open all the doors and windows to 'let the thunderbolt out', not aware that it is simply the movement of electrical energy between clouds and the surface of the Earth. Similarly, a neighbour's 7-year-old recently asked his mother, *'What causes the bangs during thunderstorms?'* After a prolonged pause she replied, *'Not sure; I think it's the clouds getting angry'*. One task of primary science, then, is to equip children with the basic skills and the right mind-set to begin to observe, question and understand everyday phenomena on Earth. What evidence would they need to check out grandma's theory? This 'real' science has been called 'children's science'; that is, applying scientific principles to their own endeavours, to be agents of their own learning.

Another piece of real scientific equipment that all children come across is the 'fridge. Hardly ever do we pull it away from the kitchen wall, though, to see and feel what goes on in the

'works' at the back (so before you throw your old one away, learn from it!). If you do, you will understand how **Buntingsdale Infant School's** innovatory heating system works – like a 'fridge in reverse, using the ground to heat their school, how this has saved them huge energy bills, and how your school could potentially do the same (see page 12).

Think local

Buntingsdale tackled a real problem in the school. And trees – now they are definitely real. And so are bottle corks. In Portugal, cork oaks are an important part of the economy; so what better for children to grow and study than cork oak trees? This is exactly what **Francesca Fernandes, Luis Mendonça de Carvalho** and **Margarida Silveira** encouraged them to do, the children responding with careful observations, beautiful pictures and lots of acute questions that they set about answering (page 9). And it doesn't have to be trees, of course; you will know best what is of significance in your area: a local enterprise, a river, hill, farm, wood or beach, maybe a particular event. In Jim Lynch's novel *The highest tide* (Bloomsbury, 2005) a small boy living on the north-west coast of America attracts national media attention because he finds a giant squid, oarfish and all kinds of unexpected and beautiful marine life in his local bay. Some people begin to invest him with special, even religious, powers. Miles explains this simply, however: 'I see more because I look more. Most people never see anything because they're never looking'.

In other words, being attentive, perceptive, yet with a sceptical respect for what you observe, in many ways sums up the 'first commandment' of science for young children. One swallow, as we know, never makes a summer. Nor, as Lynch says, in being scientific, do we 'need to squeeze the magic out of everything'. On the contrary, when children really look into a rock pool or whatever, they find it utterly magical. Science is not really about what we already know; it is much more about what we want to know, need to know, and how to find out.

So this issue focuses on aspects of science that arise from the real experiences of children, in school, out of school or at home. And first, **Stephen Lunn** reminds us, in a very simple way, how children can understand what science is and how real scientists work: asking questions, establishing what is already known, using observational evidence, etc. This approach is a valuable template for lots of real scientific thinking in school. **Lisa Castle, Susan Breen** and **Lynne Tandy** demonstrate how, with the right backing and ideas, there can be a real impact on parents and other family volunteers in understanding what science means for their children.

The issue concludes with an article by **Dan Hillier** describing an exciting professional development project in Scotland involving 'real' science institutions such as the Royal Observatory Edinburgh.

Alan Peacock

Correction

We apologise for an error in the article 'Can you see?' (*PSR 93*). Figure 2 on page 9 shows light being focused in the human eye, though the diagrams do not show clearly that light is refracted by both the cornea (not marked in the diagram, though this is the front surface of the eye) and the eye lens. We are grateful to a reader for pointing this out, and hope it did not mislead others.

PSR themes

Each issue of *PSR* focuses on a theme, but also includes other articles on a range of topics, so if you have something to write about that is not on a theme or deals with a theme already covered, don't be deterred. All contributions are very welcome. Forthcoming themes are listed below.

PSR 95 (Nov/Dec 2006): Why science?
(special 20th anniversary issue with invited contributions)

PSR 96 (Jan/Feb 2007): Earth, air, fire and water
(copy deadline: 15 Sept. 2006)

Writing for PSR

Primary Science Review is for sharing information and ideas that support effective practice in science education at primary level. It includes articles about teaching, learning and assessing science for children aged 3–12. We welcome articles that provide insights into familiar classroom activities as well as those containing novel ideas. However, we look for reflection on practice rather than simple description. Short letters, viewpoints, ideas or queries are also welcome.

It isn't difficult to get your words into print. You can help by following a few simple guidelines:

- Keep your contribution short: articles should be no more than 2000 words; letters and viewpoints much shorter.
- Use straightforward language and an economical style, avoiding jargon.
- Submit the article either by email or in hard copy form (three copies please).
- We welcome illustrations but please do not send them embedded in the text. If sending photographs electronically please save them as JPGs. Always use high quality when taking electronic photographs. If sending them as hard copy, send us photocopies in the first instance. (Please note, written permission from parents and the school must be obtained to use photographs of children.) Good-quality colour photographs are especially welcome for the cover.
- Don't forget to include your name, position, home and work addresses and phone/fax/e-mail details.
- Please don't send your article to more than one journal at a time.

Editorial Board members are always very willing to give advice to those writing for *PSR* for the first time. Submitted articles are reviewed by members of the Editorial Board, which can take up to eight weeks. You will then be contacted with a decision or any comments or suggestions for revision.

All contributions should be sent as an email attachment to: **psreditor@ase.org.uk** or posted (three copies) to: The Editor, Primary Science Review, ASE, College Lane, Hatfield, Herts AL10 9AA.

A more detailed version of these guidelines is available on the ASE website: **www.ase.org.uk** or by post from the ASE.