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For Primary Schools and Teachers of S1/S2 courses

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Put some colour into your life

If your school uniform policy is running smoothly, the children in the class facing you may well all be dressed in the same colours. However in more relaxed regimes, and on days near the holidays, things may be a bit more colourful. Colours around us, on clothes or furnishings, can potentially influence our mood. Some animals can change their skin colour to adapt to their surroundings, behaviour or mood. In the past, when dyes for clothing had to come from natural sources, our choice of colours was limited. Up to the late 1800's, until the advent of chemical dyes, fabrics such as *Harris Tweed* were dyed using plant materials. In this issue, we look at a number of interesting activities for children to extract pigments from plant material and use them to dye fabrics and make acid /alkali indicators.

Primary Summer School, Edinburgh 2006

The first residential Summer School for Primary teachers was held at the end of the Summer term in Edinburgh. The programme was designed to follow an interactive approach focussing on aspects of science relevant to the primary curriculum and exploring activities that support the aims of *A Curriculum For Excellence*.

Audacity - On the back page see the mind-map showing how to get a hold of and make the most of this great program.

Dyeing for a change of look? Go natural!

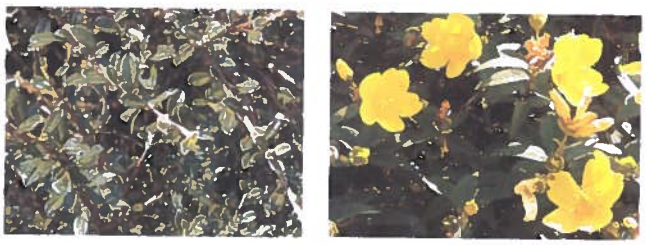
Before attempting any work with plants refer to the ASE publication *Be Safe!* (£6 + p&p from SSERC). See pages 30 & 31 for advice on potential hazards i.e. a Safety Code for using plants as well as a list of plants which primary children should not touch.

Extracting the colour

Squeezing the ripe fruit and collecting the juice can provide a convenient source of coloured extract in plants. Brambles, elderberries and cherries are plentiful in late Summer and Autumn (Figs 1a,b). You may know only too well from experience how effective fruit juice is at staining fabric, lips and skin!

Alternatively, the fruit and other parts of the plant, (Figs. 2a-e) e.g. leaves, stems and flowers can be cut up and soaked in water. If the colour is very pale, try heating the cut-up plant material and water in a microwave to give a deeper colour. This is often just a paler version of the starting material but surprisingly e.g. with the flower heads of purple buddleia, you get a deep yellow solution. The liquid from red buddleia gives a liquid which dyes fabric another shade of yellow. A beautiful red colour came from the leaves of an ornamental bush (Berberis), and this dyed material a strong shade of pink. It really is trial and error to find what plants in your local area will give good results.

Figures 1a & 1b - Brambles and cherries give good dyes



Figures 2a & 2b - Cotoneaster and Hypericum

Figures 2c & 2d - Ragwort and Berberis

Figure 2e - Thistle

Dyeing cotton fabric

To ensure colours do not wash out, a *mordant* is often used to *fix* the dye to the fabric. The dye molecules are initially only caught between the fibres of the fabric and only become permanently bonded by using a mordant. **Because they often contain metals, mordants are not recommended for use by children.**

Soak *Post-it* sized (7 x 7 cm) squares of white cotton in your dyes until the colour appears to take. The longer you leave them, the more intense the colour (Fig. 3). We have also heard that you can give containers (microwaveable) a quick zap in the microwave to help the dye stew.

Figure 3 - Fabric samples soaking in plant extracts

The indications are good

Many of the coloured solutions can be used as pH indicators and will change colour when exposed to acids or alkalis. The solutions can be tested by adding a drop of vinegar or sodium hydrogen carbonate (bicarbonate) to a drop of the test sample on a white tile (Fig.5).

Once a plant extract can be found which produces a pronounced colour change in acid or alkali, the solution is ideal for making indicator strips and a wider range of dyed colours in fabrics.

Making indicator strips - These strips, once dried, allow a convenient and portable method of testing liquids for

Figure 4 - Dyed fabric samples

acidity or alkalinity. Cut small strips (approx 1 x 8 cm) of absorbent paper, (blotting paper, filter paper, kitchen roll). Label with a pencil before soaking them in the coloured samples and allowing them to dry out. Take one strip and touch one end against something acidic e.g. a cut lemon or vinegar. You may see a colour change. Try the other end against wet soap or a solution of sodium hydrogen carbonate and note any colour change. Is it a different colour to that obtained by the acid?

Make a number of indicator strips and use them to test other liquids or the cut surfaces of fruits. Make a table showing evidence of acids and alkalis.

Using acids & alkalis for more interesting effects - Soak pieces of fabric in the coloured solution and allow them to dry. If the colour change is most pronounced with acid use a cotton bud dipped in vinegar to make patterns, or use a solution of bicarbonate or soap if alkali gives a better colour change. It would be ideal if you were able to show both colour changes on the one piece of fabric.

If fresh plant material is difficult to acquire all is not lost. Boiling chopped up red cabbage can make very good indicator solutions (Fig. 6). The water will take on a strong

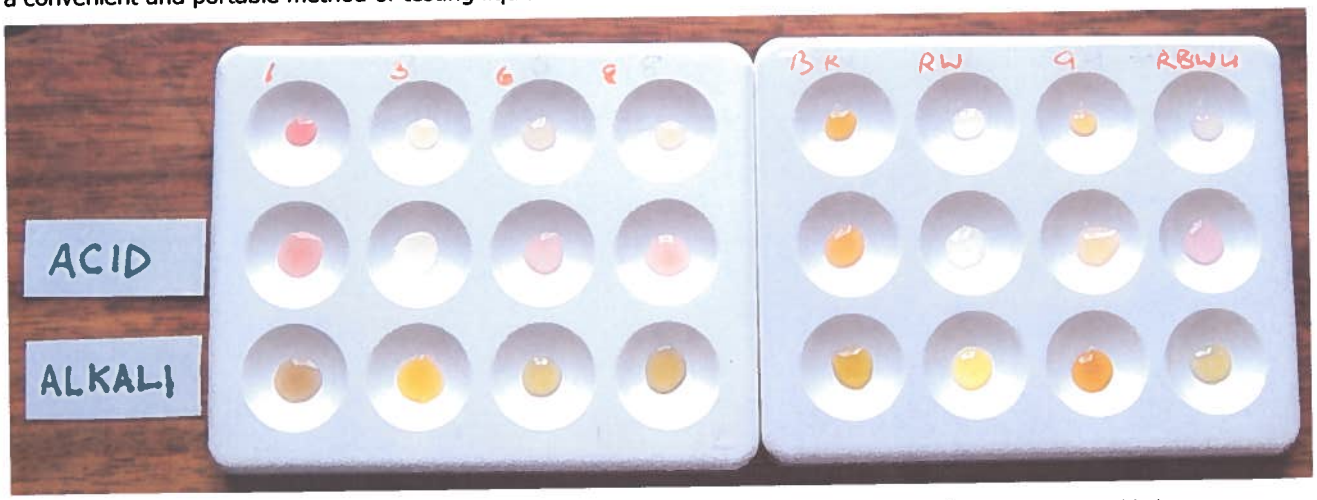


Figure 5 - Top row - Plant extracts, Middle row – Drop of vinegar added, Bottom row - drop of sodium bicarbonate added

colour and this can be used as an indicator solution. Fresh red cabbage is not always available but if you buy a jar of pickled red cabbage, you will find that the vinegar has developed a strong colour. You can soak absorbent paper or fabric in this and let it dry. If you then apply an alkali, such as soap or bicarbonate you can see a distinctive colour change (Fig. 7).

Figure 6 - Paper stained with red cabbage water. Drops of alkali added (left), drops of acid added (right).

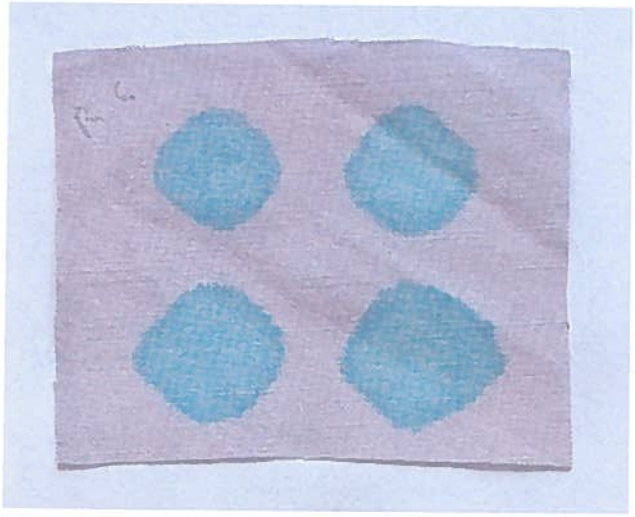


Figure 7 - Fabric stained with red cabbage vinegar. Drops of alkali added.

Primary Summer School Edinburgh June 25th-28th 2006

The summer school was organised by Careers Scotland with materials and activities provided by Johnston Space Centre (Houston), Dundee University and several partners in the *Support for Science Education through CPD Initiative*. It also included visits to the Royal Observatory, Our Dynamic Earth and Royal Botanic Gardens (Edinburgh).

Participants experienced a wide variety of aspects of the science curriculum with activities for all stages.

Educators from America, working for NASA, ran three different workshops giving lots of excellent hands-on activities for Earth and Space, including formation of volcanoes and making a cooling garment which was of similar construction to the suits worn by astronauts. They compared the conditions on Mars and Earth and introduced us to the *Goldilocks Planets* i.e. neither too hot nor too cold and therefore increasing the chances of life having existed in the past or being sustainable now and in the future. After the final workshop, one of the educators was returning to America to be on hand for the imminent arrival back to Earth of the Space Shuttle Discovery (pic opposite), which brought home to the Summer School the reality of the space programme.

Other workshops included Scotland's Journey (geology and the rocks of Scotland), Let's Talk (raising scientific issues with young people), Fun with Forensics, Introduction to Plant Science and Energy and Forces (demonstrating the potential of toys as teaching aids).

At the end of a busy three days the participants agreed that it had been a very worthwhile experience, their confidence in their ability to teach science had increased and they were taking home lots of new ideas and resources.

Energy and Forces - Toys

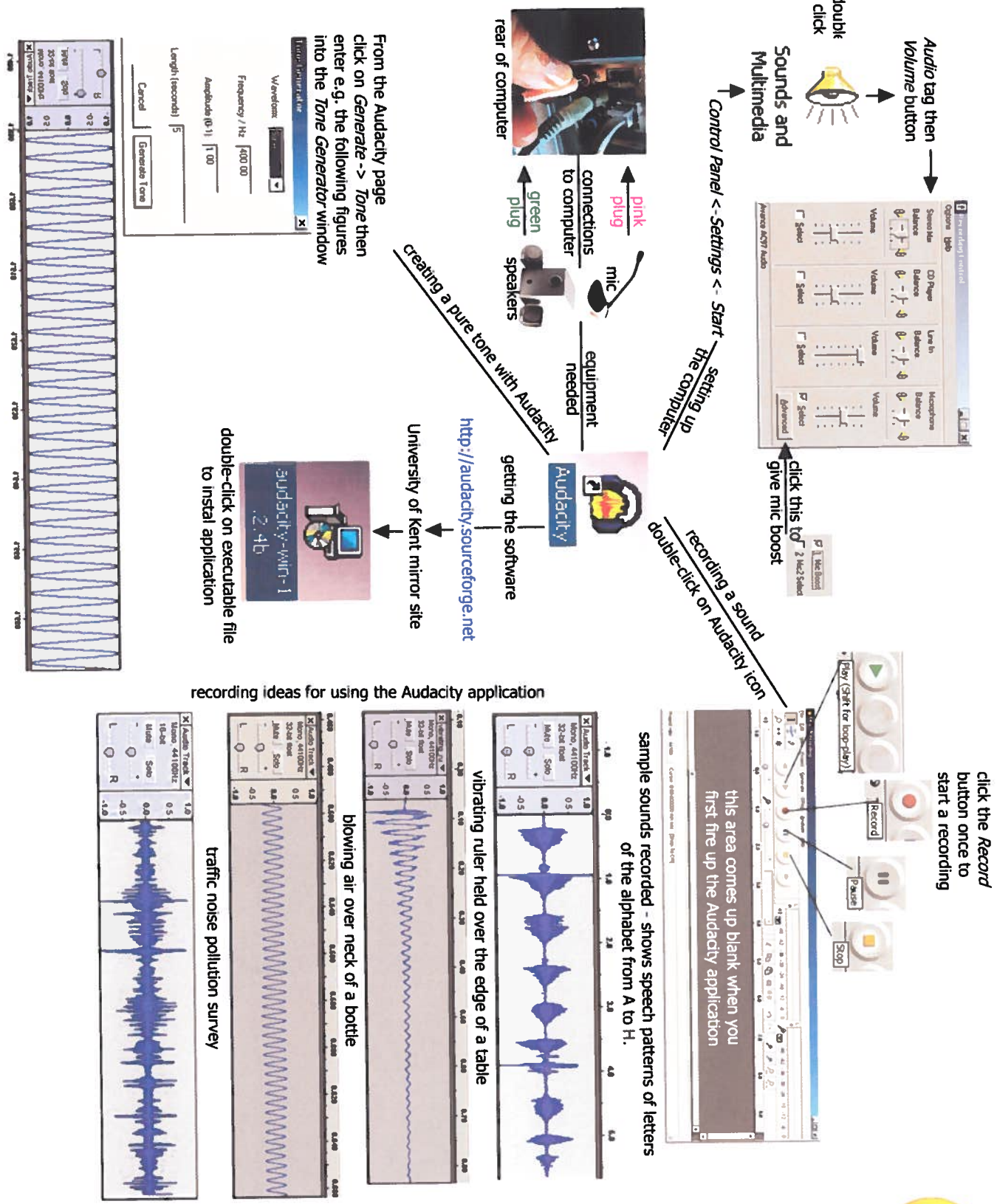
Modelling volcanic lava flows

Sun hats and solar necklaces

Plant science - making fruit smoothies & viewing the sun safely

Audacity - adopt an audacious approach to the study of sound (method mind-map)

For the last couple of years my younger son has been using various incarnations of this wonderful application to realise his musical creations by the use of multi-track recording and editing. It is extremely easy to use and can export sounds as *wav* and *mp3* files. Looking at groups 10 and 24 iin the *Framework for Planning* on *ISE 5-14* and it is apparent that Audacity can serve as an excellent tool for investigative work in the study of sound ... and the best bit ... it's free!



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