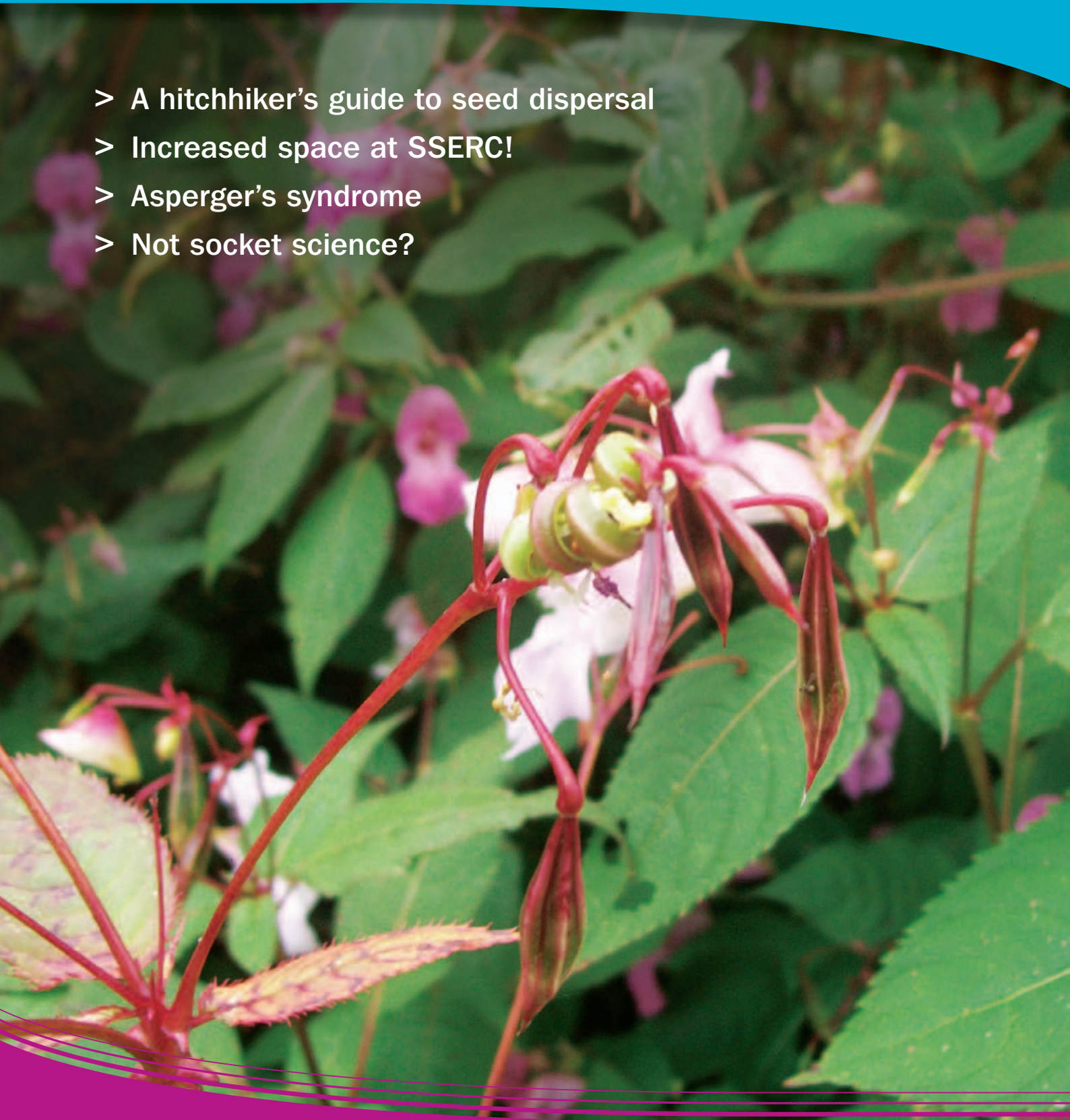


Primary Science & Technology *Bulletin*



Ideas and inspiration for teachers in Primary Schools and S1/S2

- > A hitchhiker's guide to seed dispersal
- > Increased space at SSERC!
- > Asperger's syndrome
- > Not socket science?



A hitchhiker's guide to seed

Getting out and about forms an important part of the curriculum and autumn is a wonderful time to encourage learners to explore a local hedgerow, woodland, or indeed any safe and accessible outdoor area.

It is worth reminding ourselves of the principles and practice that underpin science teaching as *CfE* sciences document states [1]:

Children and young people participating in the experiences and outcomes in the sciences will:

- develop a curiosity and understanding of their environment and their place in the living, material and physical world;
- demonstrate a secure knowledge and understanding of the big ideas and concepts of the sciences;
- develop skills for learning, life and work;
- develop skills of scientific inquiry and investigation using practical techniques;
- apply safety measures and take necessary actions to control risk and hazards;
- develop as scientifically literate citizens with a lifelong interest in the sciences;
- establish the foundation for more advanced learning and, for some, future careers in the sciences and the technologies.



Figure 1 - Apples growing on tree.

Autumn provides a perfect opportunity to investigate seed dispersal. The types of activity described in this article could give learners the chance to explore a variety of science inquiry skills - as outlined by the *Curriculum for Excellence* Sciences: principles and practice document [1]. Two of the 4 main approaches to science inquiry are:

- observing and exploring - careful observation of how something behaves, looking for changes over time and exploring 'what happens if...?' and 'how could I...?' questions;
- classifying - through identifying key characteristics.

Even a short walk along a local hedgerow or path at this time of year can present examples

of the many and varied ways in which plants distribute their seeds. Learners will have had the opportunity to plant seeds and care for plants throughout their time at school as outlined in the *CfE* Experiences and Outcomes [2].



Figure 2 - Wild rose hip.

dispersal



Figure 3 - Close-up of a rose hip.

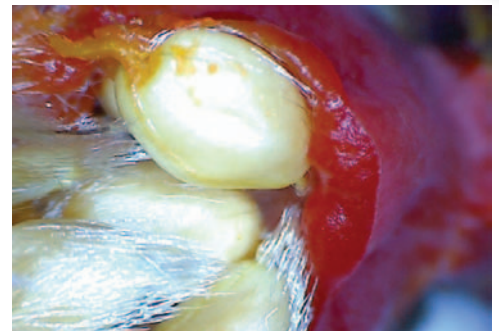


Figure 4 - Close-up of a rose hip.

I have helped to grow plants and can name their basic parts. I can talk about how they grow and what I need to do to look after them - [SCN 0-03a].

I can help to design experiments to find out what plants need in order to grow and develop. I can observe and record my findings and from what I have learned I can grow healthy plants in school - [SCN 1-03a].

As part of learners' investigations into the lifecycles of living organisms they will be aware that - following successful flowering, pollination and fertilisation - plants produce seeds.

By investigating the lifecycles of plants and animals, I can recognise the different stages of their development - [SCN 2-14a].

Learners will be aware that, if provided with the suitable conditions, seeds can grow into new plants, but they may not have thought about how and why plants spread their seeds.

Providing the opportunity to look inside a piece of fruit, an apple for instance, will demonstrate that there are seeds inside (these can be successfully grown to maturity over the course of a few years - the fruit of which may be markedly different from the original apple).

Just taking a look at a heavily laden fruit tree (Figure 1) could encourage learners to think about what would happen if all the fruits fell off the tree and each seed began to grow around the base of the parent tree. Learners can explore the importance of plants finding a place to grow with space, light and access to water and minerals from the soil. It is important that plants disperse their seeds and this can take place in a number of ways; examples can be collected or photographed, sorted and classified. Remember to follow guidelines surrounding the collection of plant material as some plants may be rare or poisonous and therefore unsuitable for handling by learners [3].

Animal dispersal

This method of dispersal relies upon an animal moving the seed away from the parent plant. Some plants produce juicy, often brightly coloured fruit which ripens as the seeds mature - the ripe fruit is often sweet and scented to attract animals, many of whom quickly learn to tell when a particular fruit is at its best (Figure 2). Dispersal can be achieved when an animal eats fruit which contain one or more seeds (Figures 3 & 4). The seeds pass through the digestive system of the animal unscathed where it is then deposited in a new location complete with a handy supply of fertiliser!

The close-up images of a rose hip shown (Figures 3 & 4) and other images (Figures 7, 8 and 9) were taken using a Veho USB microscope - see SSERC Primary Bulletin 61 for more details [4].

Some animals collect and store seeds as a food source for later in the year. These "take-aways" include nuts, conkers and acorns (Figure 5) and are often squirreled away, buried for later and forgotten about, providing the seed with an opportunity to germinate in a new location. These fruits and seeds provide an important food source for many animals and illustrate just how closely linked and interdependent species are within an eco-system. Remember to remind learners that many fruits, especially berries, eaten by animals may not be safe for us to eat and so should be left on the plant and not ingested. Guidelines covering outdoor learning and hand hygiene should, of course, always be followed when investigating the natural environment. ▶



Figure 5 - An acorn.



Figure 6 - Burdock.



Figure 7 - Close-up of the burdock seed pod.

I can explore examples of food chains and show an appreciation of how animals and plants depend on each other for food - [SCN 1-02a].

Other plants e.g. burdock (Figure 6 & 7) and cleavers (Figure 8) rely upon animals to disperse the seed in other ways; the seed or its pod can attach to the fur of an animal via physical contact. The tiny hooks on the fruit or seed case fix firmly to the animal's pelt - these are eventually shaken, or scratched, off shedding seeds some distance away from the original plant.

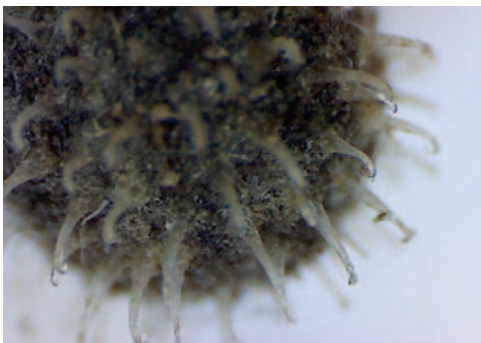


Figure 8 - Cleavers.

Wind dispersal

Learners will be aware of dandelion "clocks" (Figure 9) and most schools could easily access examples of these seeds from the local environment. Each seed develops its own "parachute" - ready to be dispersed at the slightest gust. This method of seed dispersal appears to be quite successful, judging by the abundance of dandelion plants in the environment! However the vast majority of seeds do not settle in hospitable locations and therefore do not reach maturity, hence the need for so many seeds to be produced. Other plants also rely upon wind dispersal including rosebay willowherb (Figure 10) and thistles. Many trees including ash (Figure 11) and sycamore have seeds with wing-like structures to help the seed stay air-borne for longer - simple paper helicopter models can be made and tested by learners [5] [6] [7] [8] to demonstrate and investigate this method of dispersal.

Self dispersal

Some plants have modified seeds cases and fruits that actually play a part in seed dispersal. Once seeds are ripe the case, or modified fruit, bursts open - exploding and scattering the seeds. Examples of these exploders are gorse (Figure 12) and Himalayan balsam (Figures 13 & 14), Himalayan balsam is an invasive, non-native species, often spreading along water courses - although it does provide a good source of nectar for bees and other pollinating insects, this may be to the detriment of native plants which can be ignored by pollinators [9].

Other plants use a "pepperpot" method to shake the ripe seeds free e.g. poppy (Figure 15 & 16).

Water dispersal

Some plants have buoyant seeds and use this property to transport and disperse their seeds via water. Native species include yellow flag iris - however research will reveal more exotic plants which use this

dispersal method - for instance the coconut palm. Botanically speaking the coconut (the fruit of the coconut palm) is not actually a nut but a structure called a drupe; which also correctly describes blackberries and raspberries.

I have observed living things in the environment over time and am becoming aware of how they depend on each other - [SCN 0-01a].

I can distinguish between living and non living things. I can sort living things into groups and explain my decisions - [SCN 1-01a].

I can identify and classify examples of living things, past and present, to help me appreciate their diversity. I can relate physical and behavioural characteristics to their survival or extinction - [SCN 2-01a].



Figure 9 - Dandelion "clock".



Figure 10 - Rosebay willowherb.



Figure 11 - Ash tree.



Figure 12 - Seed cases burst open.



Figure 13 - Himalayan balsam.

Further activities could be undertaken in relation to seed dispersal, these might include making and using a key to classify and identify or asking learners to “design a seed” based on their explorations. The method of dispersal could be modelled using a variety of materials e.g. hook and loop fastening to mimic hitchhikers, fabric or paper parachutes to demonstrate wind dispersal and floating objects to mimic water dispersed seeds. Learners could name their imaginary plant and describe the kinds of habitat it might thrive in. Lots more ideas are contained within the Science and Plants for Schools (SAPS) publication *Plants for primary pupils* available on-line [10]. The Field Studies Council (FSC) publishes a number of guides to common plants - these provide useful advice on identification and ideas for sampling in the outdoors. FSC/SAPS also provide good identification guides on seed dispersal which might be a valuable resource.

- Some fruits, berries and nuts may be poisonous - do not allow learners to eat plant material during these activities.
- Observe good hand hygiene during and after the activities.

For more information please contact SSERC [12].



Figure 14 - Himalayan balsam seed pod.

References

- [1] www.educationscotland.gov.uk/learningteachingandassessment/curriculumareas/sciences/principlesandpractice/index.asp
- [2] www.educationscotland.gov.uk/thecurriculum/howisthecurriculumorganised/experiencesandoutcomes/index.asp
- [3] www.plantlife.org.uk/about_us/faq/is_it_illegal_to_pick_common_wildflowers_in_the_countryside/
- [4] <http://tinyurl.com/SSERC>
- [5] www.nationalstemcentre.org.uk/elibrary/file/160/package_helicopter...
- [6] www.naturedetectives.org.uk/download/helicopter_seeds.htm
- [7] www.primaryscience.ie/media/pdfs/col/paper_helicopters.pdf
- [8] www.exploratorium.edu/science_explorer/roto-copter.html
- [9] www.plantlife.org.uk/wild_plants/plant_species/indian_himalayan_balsam
- [10] www.saps.org.uk/primary/teaching-resources/539-plants-for-primary-pupils-booklets-overview
- [11] www.field-studies-council.org/
- [12] sts@sserc.org.uk

Health and safety advice for outdoor learning:

- Always check and follow your Local Authority’s guidelines when working outdoors.
- Produce an up-to-date risk assessment prior to undertaking the activity - include road safety advice if applicable.
- Some plants may be poisonous (or rare) and therefore unsuitable for handling by learners - it is preferable to photograph plant material of this kind.



Figure 15 - Poppy’s “pepperpot”.



Figure 16 - Close-up poppy.

Increased space at SSERC!

Teachers and technicians who have been to SSERC on courses or just to pop in for advice have probably been in either our meeting room or laboratory, the latter being slightly larger than most school labs in order to accommodate 20 adults.



On September 17th, Dr Alasdair Allan MSP, Minister for Learning, Science and Scotland's Languages opened a new building that greatly enhances our training space. Unit 1, Pitreavie Court had been empty for some time. With considerable support from our local authority partners, in particular Fife and

South Lanarkshire Councils, and through funding from the Wellcome Trust, Myscience and the Scottish Government, SSERC was able to lease and refurbish this building.

Just as the SSERC lab in Unit 2 can be thought of as a slightly scaled up school laboratory, the ground floor of the new building has been turned into a scaled up school technology area with the space and machinery to run training for technical education teachers and technicians. The ever-popular Safe Use of Workshop Machinery can now be run in-house, complemented by new courses in Hot Metal Working and Digital Design.

The upper floor has an area that can accommodate large meetings and support primary science and technology professional development, making it possible to accommodate the sorts of numbers of course participants that would previously have required the hire of a hotel function room. Also on the upper floor is



a permanent Glow studio with video facilities. SSERC's interactive "Cookalong" Glow CPD has proved to be very popular but until now has necessitated the speedy construction and subsequent packing away of a temporary studio in Unit 2. The opening event allowed representatives of many of SSERC's partner organisations to not only visit the new facility but to see elements of our experiential CPD courses for themselves. In a short speech, Dr Allan praised the work of SSERC and emphasised the importance of STEM to the Scottish economy. ◀

Asperger's syndrome



We recently had an enquiry asking for advice on supporting a pupil with Asperger's Syndrome. This is a form of autism, so we contacted the National Autistic Society [1] for advice.

We recommend visiting their website for details of the condition. The society could not have been more helpful and, with permission, we have reproduced their advice here. Whilst not every piece of advice will apply to an individual pupil with AS, we hope that it will help you with the special risk assessment necessary for pupils with this syndrome.

The main thing to bear in mind is the communication needs of someone with Asperger's Syndrome (AS). Though the person may appear fluent in English they will probably take longer to process spoken language, so when asking a person with AS a question you need to keep sentences clear, simple, and short. Slow delivery in a calm voice is advised.

People with an AS have a literal approach to language, so avoid figurative language or idioms. Give them time to process the language, before expecting an answer, e.g. count to 20 silently.

If you are addressing the whole class at once, the person with AS may not realise that they are included and should be listening unless you say their name to call their attention. This is because people with AS often find it difficult to tune in to what's important, especially if there are extraneous sounds around. It also may be hard for a person with AS to concentrate if they are troubled by or sensitive to noise, a common phenomenon in the condition.

In situations where you are giving instructions, it's always useful for the person with AS to have written backup of the instructions to refer to. Many people with AS are visual learners, so using visual supports in the **written backup** and having visual notices in your classroom is helpful too.

Step by step instructions are helpful as people with AS are not always aware of stages in a process that other people may pick up instinctively.

Some people with AS will ignore instructions that do not seem logical or necessary to them. This is obviously a problem when it comes to safety advice. It is difficult for people with AS to see or imagine the consequences of their actions; this is one of the characteristics of the condition. When giving an instruction like "wear eye protection", explain the possible consequences of not doing so. Many people with AS observe rules they have been given meticulously, so where possible rules should be laid down and communicated in writing. Consider asking the pupil to indicate their agreement that they will follow a safety instruction, for example by ticking a check box. Don't be surprised if the person picks up on and reproaches others for not obeying the rules!

We are very grateful to the National Autistic Society for their help both in dealing with the original query and with this article. ◀

You will find some information on these links:

- Visual supports www.autism.org.uk/24388.
- Communication www.autism.org.uk/18350 (mainly for parents of children).
- Organising www.autism.org.uk/31133.

References

- [1] www.autism.org.uk.

Not socket science?

Have a look at the humble UK 3 pin electrical socket. It epitomises what health and safety people call an “engineered control measure”.

The steps to protect people from harm are built into it - no need to rely on them putting on protective equipment, no need to rely on them behaving in a sensible manner. A UK socket does this by having the live and neutral terminals covered by a shutter that only opens when the slightly longer earth pin is inserted. This design, to BS 1363, has been around since 1947. Some recent designs need all three pins to be inserted simultaneously before the shutters will open.

We have recently heard of some educational establishments taking further precautions that they feel will make these sockets even safer, namely fitting plug-in socket covers. Is this the right thing to do? The Royal Society for the Prevention of Accidents (RoSPA) [1], after describing the safety features outlined above, has this to say, “RoSPA therefore does not consider it necessary to recommend the use of socket covers.” Others think that socket covers are actually dangerous. If they are not made to the correct dimensions, they can damage the sockets. Many are flexible or brittle, leading to the situation where a child could insert the protector upside



Figure 1 - Wrongly inserted socket protector.

down (Figure 1), thus opening the shutters and exposing live and neutral sockets. Similarly, if the cover snaps when a child attempts to remove it, the earth pin may remain in place, keeping the live terminal open. The website <http://www.fatallyflawed.org.uk/> has a picture of a paper clip that has been inserted into the live terminal of a socket fitted with a protector.

Advocates of the covers point out that they are not solely to stop children from sticking foreign objects into sockets. They prevent a child from plugging in an iron or electric fire, for example, and burning themselves or starting a blaze. RoSPA's advice is again

helpful. Unused electrical equipment should be kept out of the way of children until they are old enough to be able to use it safely. This seems like a far better control measure than socket covers which may introduce hazards of their own. As we have said before, if your employer tells you that you must carry out a particular action for reasons of health and safety, SSERC cannot override that advice, but we are very happy to engage with local authorities and school management/governors when their advice is at odds with our own. ◀

Reference

[1] <http://www.rospa.com/faqs/detail.aspx?faq=595> (Accessed July 2013).