
Support for plant sciences – the role of the Gatsby Charitable Foundation

The Gatsby Charitable Foundation's interest in plant science dates back to the 1980s and its commitment to this area continues to grow. The overarching aim of Gatsby's plant science programmes is:

to develop basic research in fundamental processes of plant growth and development and molecular plant pathology, to encourage young researchers in this field in the UK, and to support improved introduction to the world of plants within school science teaching.

Despite the critical role that plant science will need to play if we are to find solutions to arguably the greatest problems facing the planet in the 21st Century (climate change, food security, energy production, etc.), study in the UK of plant sciences and plant science research attracts relatively few people compared to other branches of the biosciences. Anecdotal evidence suggests that there is a growing problem, in the UK and beyond, in recruiting sufficient high calibre scientists into plant science. Gatsby has recently commissioned research to investigate this issue further and seek hard data.



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Artist's impression of the new Sainsbury Laboratory – Cambridge

In the last 10 years alone, Gatsby Trustees have approved grants totalling more than £56 million for work in plant science. In addition to this impressive sum the Foundation has recently committed a further £89 million to the construction, within the grounds of the Cambridge University Botanic Garden, of a new state-of-the-art centre - the *Sainsbury Laboratory, Cambridge*. This laboratory, due to open in 2010, will be a global centre of excellence for plant science research, employing over 100 of the world's best plant scientists.

SAPS – what lies ahead?

SAPS is set to undergo major changes over the coming weeks and months and this final issue of *Osmosis* allows us to bring you up to date with proposed developments.

Since 1990, SAPS has received the bulk of its funding from the Gatsby Charitable Foundation. SAPS has worked with teachers, scientists and educationalists to promote plant science and molecular biology as key curriculum areas and to support teachers and lecturers in the delivery of plant science education in schools and colleges. SAPS is now recognised nationally and internationally for its dynamic programmes and commitment to devising lively, reliable resources and encouraging their use in the classroom.

The Gatsby Trustees believe that the key focus of SAPS should now be to concentrate on the 16-19 sector (or at least a 14-19 education continuum) and in particular seek to work with the Awarding Bodies, QCA and others to help define the plant science content of post-16 curricula. To move this agenda forward the SAPS Trustees and the Gatsby Trustees have decided that the time is right for a new structure and focus for the work of SAPS. In August 2008, SAPS moved from Homerton College, Cambridge into accommodation at the Cambridge University Botanic Garden. Later in the year SAPS will no longer function as a charity but become a project of the University of Cambridge.

There will be some changes to the work of SAPS as the new organisation comes into existence. The most noticeable changes will be (i) removal of support for activities in the primary and early secondary stages of the curriculum, (ii) a reduction in the number of workshops especially in primary and early secondary stages of the curriculum, and (iii) the formation of a new team of personnel to deliver the new agenda.

Gatsby support for the work of SAPS Scotland will continue until December 2009.

Paul Beaumont, current Director of SAPS, writes:

I was appointed to the post of Director in July 2001 and since that time have watched SAPS grow from strength to strength. I have been very fortunate to work with a team of gifted and committed individuals who, through their efforts, have developed a raft of new teaching resources to support the curriculum as well as offering CPD opportunities for teachers, trainee teachers and technical staff. We have done some excellent things over the years and I am proud to have worked with, and been part of, such a wonderful group of people.

There is much left to do. It is my sincere hope that the new Director, together with his/her team, will continue to receive the support of the wider educational community in their important endeavours.

Contact Details for SAPS:

**From 1st September 2008, the new address will be:
SAPS, Cambridge University Botanic Garden, 1, Brookside, Cambridge CB2 1JE.
Tel: 01233 748455 Website www.saps.org.uk**

Our existing e-mail address (saps@homerton.cam.ac.uk) will continue for the foreseeable future.

About the Plants for primary pupils booklets . . .



Parts of a plant and their functions



1: Parts of a flower



Reproduction and life cycles
2: Pollination, fertilisation, fruits and seed dispersal



Living processes and what plants need to grow



Grouping and classification

SAPS has been producing booklets in the *Plants for primary pupils* series since 2004, in a steady stream, at the rate of about one booklet a year. The fourth title (*Grouping and classification*) is already at proof stage and should be available from autumn 2008. The fifth and final title (*Plants in their natural environment*) is currently being prepared and we expect publication early in 2009. In fact, the total number of booklets in the series will be six, as booklet 2 (*Reproduction and life cycles*) comes in two parts, each published separately, complete with a CD of supporting material. All the booklets have been published in collaboration with the Field Studies Council (FSC).

Some of the early booklets were sent to *OSMOSIS* enthusiasts as a free copy, instead of a paper *Primary OSMOSIS*. Many have been distributed freely in workshops for teachers and others involved in primary education. These workshops have been run by SAPS or through other organisations. All booklets are available for you to download from the SAPS website (subject to the SAPS copyright statement) and use in your classes. Additional supporting material is given on the website - including, for example, full-sized templates of drawings of parts of a plant, of cards for card games and so on. Some additional notes for teachers are also on the website. If you prefer the booklets as hard copy, they can be purchased from FSC publications (www.field-studies-council.org). Prices vary from £3.00 for the early ones to £6.00 for the extra large third title (*Living processes and what plants need to grow*). On the website there are two colourful PowerPoint presentations, one linked to booklet 2.2, illustrating pollination (also on the CD), and the second links to booklet 4, exploring some of the stories behind the names that we use of plants.

So for our final fling in a hard copy paper *Primary OSMOSIS*, we'll try and give some sort of overview of the series . . . not just a blow by blow (or booklet by booklet) list of contents, but a bit of an insight into the different threads that have been woven into the different themes that we have tackled - educational and scientific. This might help you see how you can weave different activities into your teaching programme, not just for plant topics in the curriculum and the science investigations that can be done with plant material, but to make cross-curricular links with literacy or numeracy, find opportunities for developing creativity or role play, or indulge in a few games that are fun but help to reinforce learning and may give a chance for ongoing assessment of a child's achievement.



Create a plant for a habitat

The hard core of the Writing group includes primary teachers and others with experience teaching children (in the field) or training teachers. Others have contributed at different times. Members of the Writing group have also run many workshops, mainly for teachers, using the materials and ideas contained in the booklets. This means that all the activities have been trialled, with children in class or in the field and with teachers. The activities are presented in a way that teachers should have enough information to do the activity and confidence to tackle something that may be unfamiliar to them. Some activities draw on the well-tried SAPS film pot, lemonade bottle or other practical techniques - so they are not demanding in terms of resources. Probably the main driving force behind the Writing group responsible for the series, is a love of and interest in plants and belief that they can become fascinating to children and provide excellent material for teaching different parts of the curriculum.

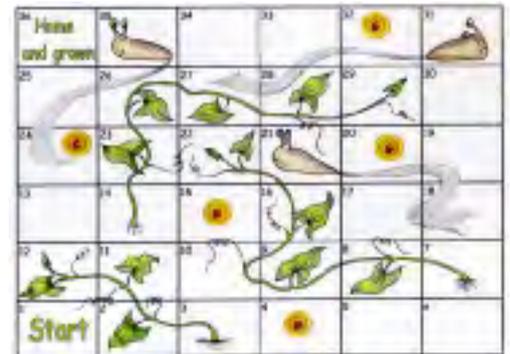
The titles show some progression of ideas through the series, but there is not necessarily a hierarchy of difficulty level. For example, the Pupil Sheets are simple in early booklets and allow children to develop more independence later. There are increasing opportunities for use of IT. But some booklets have activities for mixed ages, denoted as 'younger' or 'older' children. As teachers, you know what is best for your class and how to use the different activities. We have included a 'Curriculum links' box with all activities. Deliberately we have put this at the end for a number of reasons. Curriculum statements may change over time, but we believe the topics will remain relevant and can be used beyond these changes. We hope the different approaches encourage you to think outside the immediate box and that the activities can be adapted to suit your class and their needs. Above all, we want you and the children to understand more about plants and enjoy doing things with plants.

The following pages just give a splash of ideas, all drawn from the booklets and we hope they entice you to delve deeper and enjoy using many of the activities in the *Plants for primary pupils* booklets.

Games . . .

Games in the booklets are often quite short and give a bit of fun, but they have their serious side. They can be used for starters or plenaries or give a chance for formative assessment. They reinforce understanding and can help get the children involved. With some, like *Seeds and chaffinches*, the game gives a chance for the children to let off a bit of steam.

Card games in the early booklets help give ways of learning vocabulary and matching similar items, as words or as pictures. This can lead to links with literacy. Old favourites, such as 'Snakes and ladders' or 'Happy families', find new life as *Vines and villains* (the vines are the growing bean plants and the slugs become the villains) or *Plant quartet*. Here striking colour photos encourage children to become familiar with some common flower names and while they collect the families, they learn about what plants need to grow successfully. A 'Food chain' game is in the pipeline for the fifth booklet (*Plants in their natural environment*).



Vines and Villains



Games with cards



Plant quartet

Some games are more active and these should help children enjoy learning . . . for example, about pollination (*The pollination game*) or start thinking about seed dispersal (*The sultana game*) - lots of children like being busy squirrels, especially if there is a reward.



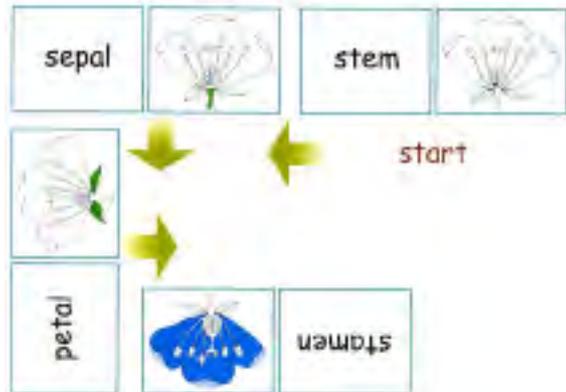
Seeds and chaffinches

Literacy . . .

Opportunities to develop literacy pervade many of the activities, and often it is difficult to draw a line and say 'this is literacy' and 'this is creativity'. The card games in the early booklets (*Snap*, *Dominoes*, *Splat*) help children become familiar with the appropriate vocabulary. There are plenty more opportunities in the fourth booklet (*Grouping and classification*) for children to develop vocabulary when trying to describe leaves - first in their own words, then building up a feel for suitable scientific words. There are suggestions for making a poster in the *Pollination and fertilisation challenge*, the 'Design a seed packet' activity gives a chance for both literacy and presentation skills and the final booklet promises to have prompts for a debate on a topical issue, such as conservation as applied to a particular area and situation.



Design a seed packet



Loop cards

Creativity . . .



Create a plant

Primary school classrooms usually are filled with drawings, posters or other products of children's creativity. Perhaps we can add a few more ideas from the booklets. In the earlier booklets, *Create a plant* and *Create a flower* give opportunities to establish the structure (and function) of different parts of a plant and the vocabulary to use to describe this. As an offshoot from these activities, depending on the materials brought in for this activity, you can have



Design a seed

discussions on sustainability and recycling. The later booklets toss in 'Design a seed' or 'Design a seed packet' (both from an imaginary plant 'discovered' on an expedition). The final booklet promises a 'Design and make a plant for a particular habitat' as a way of linking into adaptations for particular habitats. All give opportunities for creativity in the children, as well as developing skills of presentation, including perhaps telling other children about their discovery. One appealing activity comes in 'What can you turn your leaf into?' On this page we illustrate this with a 'cat and mouse', but children do come up with lovely ideas themselves.



What can you turn your leaf into?

Numeracy . . .

In most of the booklets, there are opportunities for doing something with numbers. In the second booklet (part 1), children learn to dissect a flower and count up the numbers of the different parts, looking for an underlying relationship between the numbers. In the third booklet (*Living processes and what plants need to grow*), children find out how fast roots grow and learn to work out a growth rate for their roots (seedlings grown in Petri dishes). They look at whether adding mineral salts affects the growth of radishes - try to find out the best way to measure 'growth' and can give their results in the novel form of a 'radogram' (really a modified bar chart).



Recording colours of flowers



The parts of a dissected flower



A 'radogram'

In the fourth booklet (*Grouping and classification*), children need to make quite accurate measurements when trying to describe leaves or the seeds they are sorting. Finally, the fifth booklet (*Plants in their natural environment*) promises to let children estimate the number of seeds produced by a plant (such as Rosebay willowherb) and wonder what happens to all the seeds that the plant produces. Can you make a guesstimate of the answer? . . . or will you wait for the fifth booklet and do it systematically with the children (and help them use their numeracy skills)?



Which radish has grown better?

Investigations . . .

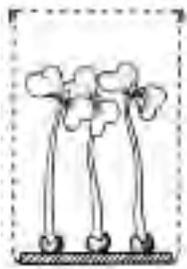
To many people, doing investigations seems to be the start of doing 'real science'. There are plenty of these in the third booklet (*Living processes and what plants need to grow*) . . . do seeds need water to germinate . . . or do they need light? . . . how strong are plants? . . . how fast do roots grow? . . . how does water travel through the plant? With the help of the 'Planning plant', children (and teachers) are led gently through the steps of an investigation - starting with the questions and what they want to find out, then leading to predictions, what they will do, how they will observe or measure, how to record and present their results and finally evaluate any results or conclusions from the investigation. There are 'Pupil Sheets' to help children record results or observations from investigations, and in the different booklets, these sheets are designed to help children become more independent as they get older, or for teachers to adapt as appropriate for their class.



The Planning Plant



Even from the first booklet, children have opportunities to grow their own plants using the well tried techniques of a film pot (as long as film pots last in this digital age) or making observations of seedling growth through the lid of a Petri dish. This gives children the feeling of ownership of 'their' plant and the excitement of watching it grow. Full details are given of techniques that can be used for growing plants - in the classroom and outside - including the special benefits of having a light bank in the classroom.



A section on *Having fun growing plants* comes in the third booklet (*Living processes and what plants need to grow*) and this may provide ideas for activities in an after school club or for enthusiasts wanting to do more in the school grounds. This 'having fun' section gives details for growing geraniums (pelargoniums) from cuttings, growing potatoes in a bucket, growing bulbs and corms in a lemonade bottle or establishing a willow arch from pussy willow shoots . . . and lots more ideas to encourage children to get involved with plants both inside the classroom and outside in the school yard (using tubs or pots) or school grounds.



Using a film can:
Do plants need light to grow?



Growing a sugar snap pea



Loss of water from a plant



We hope you all have fun with plants . . . after all, they are rather important! (*Photosynthesis and respiration made easy* in the Background information for teachers in the third booklet gives a clue as to why they are important.)

**Erica Clark (retired!)
and thanks to the rest of the Primary Writing team**

All drawings by Anne Bebbington and all photographs by John Bebbington FRPS. Thanks to the children of The Cavendish School for making all the models.

Growing seeds in a plastic bag

An activity for the Foundation Years to KS2 in order to observe seed germination.

Materials Needed

- a few seeds
- paper towel [school ones are ideal]
- stapler
- plastic bag [the A4 sized kind which seals at the top works best]
- ruler
- water
- label



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Instructions

1. First, label bag with child's name, date and seed name.
2. Next, fold a paper towel so that it just fits inside the bag.
3. Take a ruler and measure 7 cm from the top of the bag and staple a row of staples from one edge to the other through the plastic bag and paper towel. If you are using very small seeds then make the staples closer together. You will have a mini-pocket, 7 cm deep. This is where the seeds are going to sit.
4. Next carefully pour enough water into the bag so that it will soak up through the paper towel but leave a small reservoir of water at the bottom of the plastic bag [about 2-3 cm].
5. Then, take the seeds and put them in the mini-pocket so they are sitting on top of the line of staples.
6. Seal up the seed bag so no air can escape or get into it. Tape it to a window or peg to a washing line strung across the classroom.

Within a few days depending on the time of the year the seeds will begin to germinate. Children can clearly see the growth of roots and then the shoot. As soon as the young plants reach the top of the sealed bag they can be carefully removed and potted up.

Ruth Thomas, The Cavendish School

SAPS Workshops

The normal workshop programme offered by SAPS is 'on hold' until the new team is in post and decisions about the direction which SAPS will take have been made. SAPS website will have the latest news www.saps.org.uk.

Workshops in Scotland will continue to be available and anyone interested should contact the SAPS Scotland team on 01383 626 077 or by e-mail at saps@ssec.org.uk.