TSNews

Science 5 to 18: TSN can help

People not involved in TSN often think that teacher – scientist links are only useful if they engage with the learning of older pupils such as sixth form students. Not so. Definitely not so. There are many scientists who work extremely successfully with teachers of much younger children. Whatever the age of the pupils involved, it is the educational skills of the teacher, combined with the partner scientist's skills and knowledge, that are important. The teacher 'knows kids': how they learn; the best way to organise them; what language level is appropriate; and so on. The scientist provides help with the science – contexts, ideas and procedures. TSN's experience over the past four and a half years is that success ensues when the teacher and the scientist work together on a project, whether for 18 year-old A-level students in a sixth form college or 5 year-olds in a first school.

This newsletter shows the diversity of recent TSN work that engages pupils right across the age range.

Lichen on our roof

Tricia Lunness
John Innes Centre

It all started when the children at 'my' school (Dowson First School, where my partner, Anne Casey teaches) noticed that the school's old roofs were covered in moss and lichens, but the new ones weren't.

So, using some microscopes I brought in, (but working at ground level!), we looked at these strange 'plants' more closely. We talked about their sensitivity to their environment and why they grow so very slowly. They learned a number of new words and lots about atmospheric pollution – not bad for seven year olds! In fact, I was amazed with the way they happily took on board quite complex ideas, e.g. the long time it takes for the alga to form, for the fungal partnership to become established, and the eventual colonisation of lichens to take place.

The children seemed so interested that we decided to enter the children in an environmental competition for schools and settled down to plan how it could be done. The teachers knew what the children would be able to cope with and succeed at, and I knew what science it would entail. Our theme was 'Using Lichens as Pollution Monitors'.

Back at work I put together a set of 'research kits' for the children: each one had a plastic folder, pen, paper, ruler, plastic Petri dish and a plastic 15ml tube. The children took these home to collect samples of rainwater and to measure the lichens in their locality. At school, we tested the acidity of their rainwater samples using indicator solution and noted their observations of lichens.

Pollution survey: 7 year-olds show their results

After recording their work over several weeks, they presented their results on a large map and wall posters. They also gave a special assembly for their parents to explain what they had done and to show why there was no lichen on the new school roofs.

We didn't expect to win the competition; it was really for 8-18 year olds, but the children were complimented on their work and they were thrilled to be awarded a certificate signed by David Bellamy.

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Two schools and a scientist

Cheryl Crawford
Alderman Peel High School, Wells)

Peter Revill
John Innes Centre

If you chew starchy food for a few minutes, it starts to taste sweet (try it with bread). This is due to the enzyme amylase, present in our saliva, which breaks the starch down to release sugar.

Over a period of a week, year 6 (10-11 yrs) pupils from Wells Primary School and a year 8 class (12-13 yrs) from Alderman Peel High School worked together in a joint practical session to investigate the digestion of food and how enzymes work. The activity was planned jointly by the TSN scientist, his teacher partner, and the primary school teacher.

By using potato starch granules which the students prepared from a cut potato they saw the effect of 'saliva' (a solution of bacterial alpha-amylase) on the potato starch. We used semi-quantitative glucose test strip (available from chemists) to monitor the breakdown of starch to glucose.

Using their new knowledge, the primary school's year 6 returned to plan their own investigations for the next session. What would make a difference… the temperature? chopping the food up? changing the concentration of amylase enzyme? the type of food used? the length of time the food was cooked for?

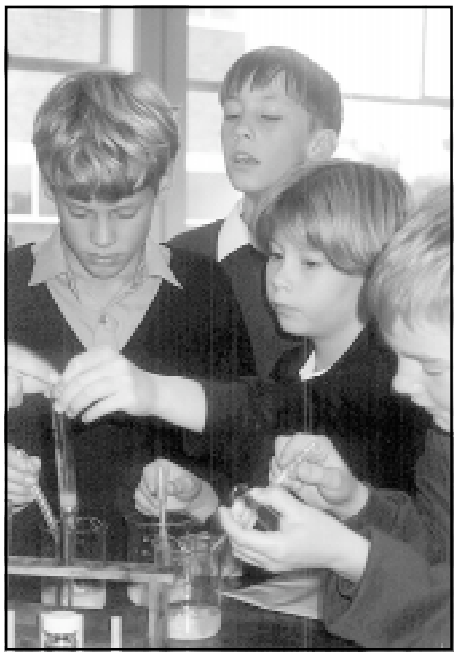
When they returned, they discussed their ideas with their scientist who helped them refine their plans. Then the high school's year 8 helped them find and use appropriate equipment and they all got to work. Food processors processed, pestle and mortars ground and water baths steamed!

Cheryl:

'For me, the teacher, there are other important educational outcomes beyond the obvious science gains. For a start the primary school children became more familiar with our high school, and this will help reduce their fears about their transition to us next year, and they became more confident. Working with a 'real' scientist will help dispel the negative image so many children have of science and scientists. Also, our high school children were given the responsibility of looking after the younger children from the primary school.'

Peter:

'And for me, the scientist, well, I very much enjoyed myself in these classes. The pupils were great with their questions and with how quickly they grasped the subject. I also had time to give a short talk on how research on the properties of starch can affect us all. In all, I left with a feeling of two good days spent on science. I have given the notes and materials to TSN so that it can be developed as another TSN loan kit.'



High school pupils work with primary school pupils in joint practical classes

Can paper be turned into sugar?

Sixth-former's A-level project at Blyth Jex High School

'…as paper is largely made from cellulose, and cellulose is formed from glucose (a sugar),' thought sixth former Nicholas Johns, 'glucose could be made from paper.' He decided to investigate this for his A-level chemistry practical project. But there were snags: how to measure tiny amounts of glucose, for example. So, he talked it over with his chemistry teacher Neil Gordon, and Neil's TSN partner scientist, Mark Roe (Institute of Food Research), who then took one of TSN's loan kits to the school – a good quality spectrophotometer which is able to make measurements with sufficient sensitivity.

Contact with a professional scientist, coupled with access to equipment normally unavailable to sixth form students, helped Nicholas produce a really first class project. Good enough, in fact, to be awarded full marks for the project by the examination board—the first time this has happened in the school.

Mark Roe:

'Nick's was a practical project to be carried out as part of the A-level chemistry course. Nick did the initial research himself and tried out a method he found in the literature. His digestion method didn't work well and his method for measuring glucose (density measurements) wasn't sensitive enough for his work. At this point, I advised him on improving his digestion method and suggested using an enzymatic colorimetric method for measuring glucose, for which the TSN's school-loan spectrophotometer was ideally suited. I have spent several years working on studies of dietary fibre and glucose absorption, and the methods Nick used were adaptations of methods I used during my carbohydrate work. Nick put a lot of time and effort into the project and, as his project was marked at 50 out of 50, I can only assume he was very pleased with the outcome. Although I pointed him in the right direction, the quality of the project was entirely down to him.

I also helped with three other projects to varying degrees. Neil has now left Blyth Jex and so I am working with his replacement, John Bentley, and will once more be helping out with the A-level chemistry projects for this year's group.'

Germination at Tuckswood First School

Josa-Marie Wehrfritz John Innes Centre

I am linked with Ros Asher at Tuckswood First School in Norwich. The theme this term has been 'same and different', and my project was designed to fit in with this and lasted about three weeks. We made use of the TSN seed kit and tried to encourage the children to explore life processes and think about setting up a fair test. The children were aged from 6 - 8.

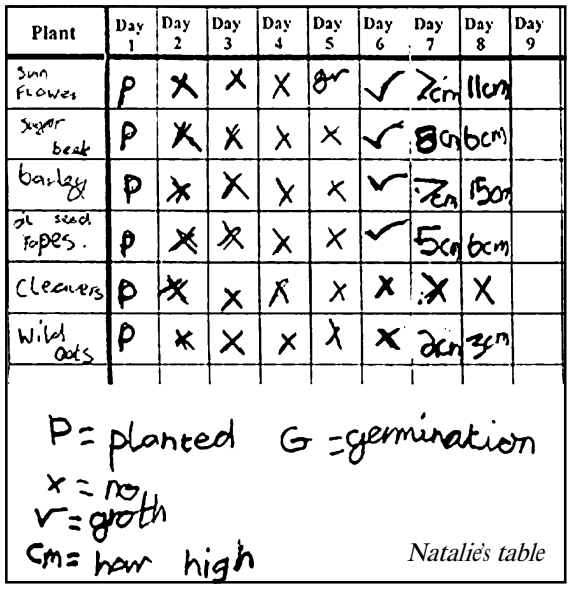
The children enjoyed sorting and grouping the different seeds using their own ideas: e.g. round/oval; light/dark. They described the seeds in their own words, and we made a table together. The children were then asked 'If we plant these different seeds all in the same way (i.e. identical conditions), will they all begin to grow (germinate) at the same time?' After a lot of discussion they designed a fair test. Not all the children agreed with each other and so we had a vote to decide on the final conditions:

- 3 seeds per pot;
- 2 cm deep (I showed them how to mark a pencil and use this to make the holes); and
- 2ml water each day (we used a 2ml syringe)

They also set up some Petri dishes with seeds on damp paper so that they could see the germination process better.

The children filled in tables to record their results. Some children also measured the rate of growth each day, and made some predictions about what they thought might happen. A couple of weeks later, they showed me their plants and their completed tables and we had a discussion about their predictions. By comparing the Petri dishes and pots, the children could see that some seeds are quick to germinate, but slow to grow an emerging shoot, and vice versa. We talked about this in the context of a the 'fair test' in the germination investigation.

Teachers at the school later told me that the children had been rushing in each day to measure their seeds, had really enjoyed the work, and were really excited about it.



Natalie's table

New Members

Welcome

Prof Mervyn Bibb John Innes Centre
Dr Sarah Oehschlager Central Science Laboratory
Miss Ros Asher Science Coordinator, Tuckswood First School
Ms Kathy Fleckney Headteacher, Eccles CEVA Primary School
Mr Richard Carter Deputy Head, Hethersett Middle School
Miss Jill Bedingahm Blyth Jex High School
Mr John Bentley, Head of Chemistry, Blyth Jex High School
Miss Emma Pilling Phd student, John Innes Centre
Ms Louise Ball Phd student, John Innes Centre
Dr Burtin Daniel Post Doc., John Innes Centre
Miss Julia Foreman Phd student, John Innes Centre
Miss Vittoria Danino Phd student, John Innes Centre

School Loan Kits

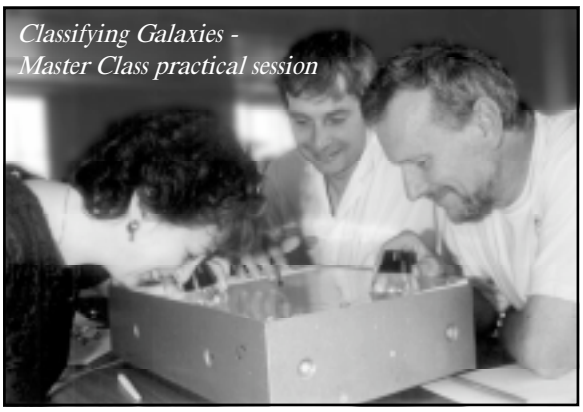
The following kits are now available.

- Seed Kits (produced by BBSRC for primary/middle schools): contains all equipment, teachers' notes, pupils' material and ideas for investigations.
- Microscope kit (for primary/middle schools): contains seven microscopes and lamps recommended for primary school use by the Royal Microscopical Society, teachers' notes and other material.
- Flexicam Kit (for all schools): this tiny camera plugs into the video socket of a TV. It can be used alone to show very close-up images (it will focus down to very short distances), or it can be used with a microscope for greater magnification.
- Spectrophotometer (for Sixth Forms): The kit can be used to find the effectiveness of UV filtration on sunglasses, the amount of iron in breakfast cereal, etc. It is also likely to be used for specific Sixth Form A-level chemistry work. Training in the use of the instrument is given by a TSN scientist.

Further information about kits from John Mallott on 01603 620337

Watt a Challenge

During the summer the second 'Watt a Challenge' competition—a collaboration between the Eastern Electricity, the LEA and TSN took part at the John Innes Centre. Sixty children came with their teachers to take part in a design-and-make competition: teams of six children were given the task of designing and building a working model that related to flight in the future. Electric motors, batteries, cardboard, glue plastic sheets, paint and other equipment supplied by Eastern Electricity littered the floor of the JIC's Conference Centre foyer while the children got to work. Teams then had to demonstrate their model to the other teams and to a panel of teachers. Eastern Electricity gave prizes to the winners and to each team taking part.



Classifying Galaxies - Master Class practical session

Cosmology Master Class

Our master classes are becoming ever more popular, and a record number of teachers attended this one on cosmology.

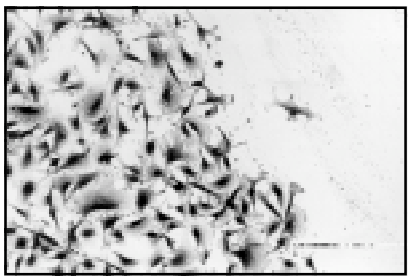
Annual Meeting 1998

Discussion this year centred upon how we might support primary school science, as we do with 'master classes' for high school teachers. We now have funding for this support and are exploring ways of working with the LEA to provide this. Watch this space.

Cancer Education

Dr. Pascale Harvey, a senior research fellow in the school of biological sciences at the University of East Anglia, is a member of a team studying the biology of human cancers.

She would very much like to participate in the education of children in primary and secondary schools in both cancer biology and its prevention. If you are interested, please contact her by e-mail: p.harvey@uea.ac.uk, or by phone: 01603 592980/593829, or write to Dr. P. Harvey, UEA School of Biology, Norwich, NR4 7TJ.



Cells isolated from lung cancer

UEA Talks for Schools

More and more local students are applying to the School of Biology at the University of East Anglia—a trend that appears to be accelerating. Richard Warn is the Admissions Officer for the School of Biology and he, or one of his colleagues, will he happy to give talks to students about applying to the University and about Biology at the UEA.

Contact Richard Warn: email r.warn@uea.ac.uk, or telephone 01603 592193.

Annual Meeting 1998

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