Kew's Christine Newton demonstrating techniques to biology teachers to improve classroom experiment success

Inject new life into the *biology syllabus*

How the world's most famous botanic garden is helping to make biology a more appealing subject…..or:… death, drugs and sex in the classroom!

Some lessons at school are naturally more eventful than others – chemistry ranks as a subject where there is room for lots of dramatic classroom practicals. Biology also offers scope, but all too often teachers stick to the theory rather than risk experiments which, in the past, have let then down.

Now, though, help is at hand to inject new life into the biology syllabus – and from a most prestigious source… the Royal Botanic Gardens, Kew.

Organisations such as Kew, with a worldwide reputation as leaders in the field of bio-science, have a great deal to offer the teaching profession. It is in Kew's interest as well to ensure that the next generation of biologists is coming through the system. But the indications are that devising innovate ways to stimulate students, and liven-up the teaching, of Biology is much needed if the subject is to gain popularity at exam level and produce under graduates.

The findings of a recent report ('Life study: Biology A level in the 21st century') make grim reading. It revealed how teachers find topics hard to teach while students think them irrelevant, uninteresting and difficult to learn.

"The research, by The Welcome Trust, confirmed the poor status given to both the teaching and study of plant science and conservation by teachers and students", explains Christine Newton who heads-up Kew's leaning department at Wakehurst Place. *"This gave us the idea to work with SAPS (Science and Plants for Schools), to devise ways to overcome such barriers. And, already, the partnership is paying dividends."*

Much of the science Kew undertakes, in its world-renowned Jodrell Laboratory and at the Millennium Seed Bank Project, is world-leading. The organisation is known across the globe for its beautiful gardens and stunning glasshouses but, behind the scene, top-level scientific research is underway – and much of it can be adapted for use in schools.

"It's about identifying the work Kew does and applying it to the curriculum", explains Sue Hunt who joined Kew at the end of 2005 from a career in bio-research, followed by biology teaching up to A-Level. *"Adapting and developing what Kew does on a professional level leads to ideal resources suitable for teaching plant science to GCSE and A-level students in schools and colleges,"* she adds.

Everything Sue does has to be relevant to secondary school teaching. The search began for examples of best practice at Kew which provide a good fit to the National Curriculum, and can be turned into practical lessons that are modern, relevant and interesting.

One tactic proving extremely popular is to stage a series of biotechnology evenings for KS4 and KS5 biology staff. Not only for

Biology teachers finding out about pollen experimentation

teachers, but technicians and heads of department too. *"We've held a series of these at both Kew and Wakehurst Place, and they have proved very popular with school and college staff"*, says Sue.

The informal evenings are aimed at motivating biology departments while helping them to develop knowledge of classroom-friendly plant and molecular science investigations. Feedback so far has been very positive.

Teaching the theory is all very well, but it can be the practical experiments where extra ingenuity is needed, as Sue Hunt knows only too well from her days teaching GCSE and A-Level. Sue says she is hopeful her work will give teachers more confidence to carry out practicals across a whole raft of the curriculum. Areas such as DNA fingerprinting, thin-layer chromatography, photosynthesis, DNA amplification, ELISA monoclonal antibodies, and bioluminescent bacteria are on her radar.

For example, teachers have long been encourage to try in-class tissue culture of cauliflower – but the result, all too often, was of a rather mouldy mess which did little to impress the students. Working with Kew's science teams, and using their 'tricks of the trade', improved sterilisation techniques can now guarantee mould-free success, time and again. Result – satisfied teachers, enchanted students.

DNA is a buzzword these days, especially in crime detection. But extracting it in the classroom isn't always easy. Until now that is. Kew has produced what it calls a 'DNA Extraction Challenge' involving a cold strawberry, a drop of gin and a little application. The result: a white cloudy mass of perfectly extracted DNA for the whole class to see.

But it's not only DNA which is popular in forensic detection – pollen too can unearth crimes and solve mysteries.

Palynology, the study of the microscopic, decay-resistant parts of plants, is something Kew has been working on for a long time. Its expertise in this area is just the sort of thing it is now passing on to schools. For Cliff Haywards, of Kent College finding out about the use of pollen analysis in crime detection (forensic palynology) was particularly useful. *"For the last couple of years we have run a forensics day for year 9s as an end of term activity"*, he says. *"After my evening with Kew, this year I can now introduce pollen analysis as an extra task to help 'ring the changes' and add variety to the lessons."*

Devising fool-proof plant experiments hasn't been easy, but Kew is determined to support teachers in delivering stimulation science in the classroom. *"It's probably our only hope of making biology popular again, encouraging students to take degrees in the subject and provide us with the next generation of plant scientists"*, says Sue Hunt who's half-way through her initial funding.

The exchange is two-way as schools can help as well as learn from Kew. Many have taken part in a hunt to discover just how long seeds can survive as part of the massive international Millennium Seed Bank Project. It meant that young people's experiments in class became part of meaningful research and contributed to the planet's future.

Hundreds of students across the UK artificially aged seed from ten of the UK's native plants for 125 days. Some were busy working in their laboratories when BBC cameras popped in to capture the action for 'A Year at Kew'.

Apart from the highly successful evening events, Kew's been staging a number of well-received CPD workshops as part of science teachers and their technicians on-going training. The subjects have ranged from cloning, why plants need light to live, the world of microbes, and genetic engineering. Sue is always open to suggestions! Email her at s.hunt@kew.org or call **01444 894055 www.saps.org.uk**

The state of the art house for alpine plants at the Royal Botanical Gardens