bioscience education

Short Communication

Science flies into the classroom with UK 'Researchers in Residence'

Christopher Sinadinos

School of Biological Sciences, University of Southampton, UK.

Date received: 27/05/2009 *Date accepted: 23/06/2009*

Abstract

Contact between practicing researchers and local school students is a recognised means of furthering student opportunities, encouraging a widespread interest in science and allowing development of teaching and communication skills for the participating scientist. The Researchers in Residence (RinR) scheme is a national initiative that promotes long term contact between researchers and small groups of pre-university school students in the UK. Since its inauguration in 1995, over 3,500 researchers have been involved in the scheme. Here, I assess the value of the RinR program from the perspective of a young researcher. Using the field of Drosophila genetics and molecular neurobiology as an example, I describe how personal aspects of a scientist's research can be utilised to promote student interest in authentic scientific research, and report on responses of the school students to the scheme. Based upon my personal experience of the scheme and of other university based school-contact initiatives, I argue that the RinR scheme offers several advantages to both researcher and student alike, as well as fostering lasting contacts between universities and schools that benefit the long term practice and teaching of science.

Keywords: Outreach, school, classroom, research, scientist

A *real scientist* in class! The email arrived amidst messages relating to my work with fruit fly larvae in transgenic *Drosophila* models of human neurodegenerative disease. It clung, chrysalis-like, impressive at the back of my mind. I soon enthusiastically attended the Researchers in Residence (RinR) training day in Oxford. RinR (www.researchersinresidence.ac.uk/RinR/) was initiated as a science outreach program by several UK universities led by the University of Edinburgh. Open to all UK scientists, it primarily aims to 'inspire young minds'. Funded by the Biotechnology and Biological Sciences Research Council and The Wellcome Trust, it forms a national network of regional divisions, each aiming to develop and consolidate links between universities and local schools in its area, while learning from other regions. Although RinR promotes interactions with local communities through arts performances and public shows, its main purpose is to place the scientist within a school for a series of classroom workshops centred on his/her own research. I recollected my own schooling, of energetic teachers such as one Mr Ryan, whose own previous molecular biological research and encouragement may have persuaded me to pursue a career in science. But never did I meet a *real*, active researcher.

I looked for aspects of my research that best demonstrate the study and practice of biology. I develop and utilise transgenic insect models of human disease, diverse work including study of animal behaviour, molecular imaging and biochemistry, and with interesting ethical and social implications. As a graduate student still on the learning curve, my own class days aren't lost in a fog of mystery, 'back in the time' when things, in the youngsters eyes, can seem like a whole different world. My vocation, I felt, could offer young, enthusiastic pupils food for thought

and discussion in the classroom, promoting a serious consideration of a career in science research. With little previous experience of working with young people, however, could I get all of this across to the students, and how?

My accommodating school teachers, Ms Cook and Mrs Deasy, shared valuable ideas with me and let me express myself. The children would need a flavour of my work, but also my personality, interests and experiences. The onus was on me. I spent the week before my placement mentally simplifying my research. The method of delivery, a conundrum at first, was a puzzle answered by further puzzles – with quizzes, crosswords and games. With the teachers help, we formulated a plan of action. My contact medium, an after school science club, allowed me to work with a few keen, capable students, who would be in need of stimulation after a long day's work, and yet were to be regaled with the complexities of my work. Role plays and experiments with real live larvae aroused the pupils' interest, however. The fruit fly, *Drosophila*, first took off as a laboratory organism almost one hundred years ago, when Professor Thomas Hunt Morgan realised that the life cycle of this 'pesky little beast' lent itself to short student projects over the summer vacation (Kohler, 1994). The fly is now a sophisticated model genetic system used in hundreds of laboratories worldwide. Yet *Drosophila*'s utility as a teaching tool is still relevant for undergraduates today (Siyad *et al*., 2005), and here, in the Hounsdown School biology department, we bred flies as they did so many years ago. How better to ignite excitement than to repeat in the classroom what Morgan's students did to discover the nature of the gene, the coding unit for life, and so much more? Whilst the advantages of exciting, discovery-based classroom science have been lauded extensively (Pelaez and Gonzalez, 2002; Laursen *et al.*, 2007), a splash of historical colour can add a rich lustre to the young pupil's scientific landscape.

Fly food for thought.

Chris Sinadinos (centre) describes the process of *Drosophila* housekeeping, genetics and chemical agent delivery to 14-15 year old pupils from Hounsdown School, Hampshire, UK, as part of a Researchers in Residence placement. The pupils were able breed flies themselves in the classroom, focusing upon development and anatomy of the larva and adult fly. They also visited a *Drosophila* laboratory in the School of Biological Sciences, University of Southampton, engaging in an interactive tour of the department's biochemical workbenches, imaging facilities and fly housekeeping incubators.

I soon also realised the benefits of the process to myself. I enjoyed sharing my academic enthusiasm, and the break from the workbench for a few hours per week for a new challenge. At school I became a representative of my field — an authentic scientist rather than a trainee graduate student. I refined my ability to explain my work in simple terms — particularly valuable when the audience represents our future public generation. With the youngsters, honest and open-minded, I considered social implications of my research, such as their fears

regarding transgenic disease model organisms. Whilst an adult lay audience might provide a more rigorous cross examination, the questions were forthcoming and a useful first step towards a public address of such issues. The pupils' excitement showed aspects of my work that have the power to captivate and enthuse. I developed my presentation skills, use of interactive materials, and management of small groups of students. Commitment to teaching and learning is important for successful academic activity, but few teaching opportunities for graduate students in science, and a corresponding perceived emphasis on the value of postgraduate research over teaching (Laursen *et al*., 2007), can make it difficult to develop these skills without national schemes such as RinR. The school teacher — pupil relationship provides an interesting insight into these topics, and a useful point of comparison with aspects of undergraduate teaching at university. Whereas higher education teaching places emphasis on self study and vocational learning (laboratory-based projects), for example, it is interesting and valuable to appreciate how autonomic study skills and experimental practice are set in foundation in today's classroom. Many school students involved in RinR schemes are those with the enthusiasm and potential to progress into higher science education. For those students who pursue other fields of study, the RinR experience can guard against fear-begetting ignorance or apathy in the face of the wider scientific effort.

The RinR scheme met expectations as an ideal learning and career development tool for the youngsters involved. A follow-up questionnaire completed by the students showed a positive reaction with 8 from 9 enjoying the experience (Q1), all students feeling increased enthusiasm for science classes after taking part (Q2), and 8 from 9 feeling that their classwork in the following months had benefited as a result (Q4) (For full details see appendix). This was corroborated by their teachers, who told me that my visit had 'made a difference' to the outlook and work of several students involved. In terms of career development, all students stated that the club had either already influenced their decision to study biology further to advanced level, or that it might yet do so (Q5), and 8 from 9 had thought further about science research as a possible career after taking part in the scheme (Q6).

A visit by the students to my laboratory late in the placement was the most popular activity with 5 of 9 students highlighting it as their favourite part of the programme. The visit allowed me to demonstrate research aspects not transportable to the school, such as chemical reagents and microscopes. School liaison schemes are common in academic departments, as are the large-scale school visits to research laboratories that they organise. The Southampton University Schools Liaison initiative (www.southampton.ac.uk/schoolsandcolleges/) organises short workshops and 'taster' open days for pre-university school students showing potential in science. These well-run events offer limited opportunity for scientists to demonstrate general aspects of research and undergraduate teaching within their department. Although contact is made with more school students than would be possible with the typical RinR placement, they do not address the personal, authentic element of one's own research that RinR nurtures. A university visit within an RinR placement, with background knowledge conveyed and trust attained, promotes a unique bond between researcher and school pupil. Analysis of a previous successful outreach programme suggests that a 'meaningful personal connection' is especially important to the students and their teacher, allowing the researcher to serve as an effective role model (Laursen *et al*., 2007). Whether at school or in the laboratory, this link is essential, and is maintained after the placement through contact with the local RinR placement officer. Amidst a busy research schedule, I can easily follow local outreach events, receive contact from the national UK Science and Engineering Ambassadors programme (with which RinR closely collaborates), and pass on project-related queries from local schools to colleagues in my department with the appropriate expertise. As the network grows and more scientists participate, the scheme's value will grow. Long may the RinR bridge between basic research scientist and school student remain standing.

Acknowledgements

Thanks go to the teachers and pupils of Hounsdown School in Totton, Hampshire, UK, for receiving me warmly, participating wholeheartedly and for their kind words following our shared RinR placement. Thank you to Prof Robert Walker for a critical reading of the manuscript, to Dr Paul Cooper and Dr Chris Jackson for advice, and to Ms Justine Charles of RinR for her suggestions and continued support. The research of the author is funded by the Biotechnology and Biological Sciences Research Council.

Communicating Author

Dr Christopher Sinadinos, School of Biological Sciences, University of Southampton, Southampton, SO16 7PX, UK. Email cas1@soton.ac.uk. Tel. +44 7905 577 778, Fax. +44(0)23 8059 4459

References

Kohler, R.E. (1994) *Lords of the fly – Drosophila genetics and the experimental life.* pp19–20, 33–37 University of Chicago Press.

Laursen S., Liston C., Thiry H., and Graf J. (2007) What good is a scientist in the classroom? Participant outcomes and program design features for a short — duration science outreach intervention in K-12 classrooms. *CBE-Life Sciences Education* **6**, 49–64 doi: 10.1187/cbe.06-05-0165

Pelaez N.J., Gonzalez B. (2002) Sharing science: characteristics of effective scientist-teacher interactions. *Advances in Physiology Education* **26**, 158–167

Siyad F., Griffiths J., Janjua F., Jackson E., Rodrigues I., Kerr F., Daniel Mackay, Simon Lovestone (2005) School students as Drosophila experimenters. *PLoS Biology* **3**, e59 doi: 10.1371/journal.pbio.0030246