Somerville Inspired Science

Discussions in Somerville have led to some remarkable collaborations

By Marian Stamp Dawkins

One of the great benefits of Oxford colleges is that they offer opportunities for effortless multi-disciplinary interactions. You don't have to make an appointment to meet someone or write a seminar talk or organise a conference. You just go into lunch* and know that colleagues from different disciplines will be there. You can ask the naïve question you've been wanting to ask but couldn't possibly in a more formal setting. You discover similarities in approach or interest in people with whom you thought, from a research point of view, you had nothing much in common. From these chance conversations can come some serious and fruitful research collaborations. Somerville seems particularly good at providing an atmosphere in which these take root and flourish.

My first experience of just how much can be achieved in this way came from an occasion when I brought a Zoology colleague, Tim Guilford, into lunch in Somerville. Tim, who was once a lecturer at Somerville and is now a Fellow of Merton, had made the spectacular discovery that homing pigeons follow roads to find their way home. By fitting tiny GPS trackers to pigeons and releasing them from, say, the top of the Ridgeway, he showed that the pigeons travelled up the A34 and only veered off to the west when they were roughly level with their home loft at Wytham. Tim still needed some statistical way of describing how closely the birds were following roads and exactly when they stopped doing this and started using some other cue to get home. I thought it might be fruitful for him to talk to Steve Roberts, one of the Engineering Fellows at Somerville. The lunch turned out to be a memorable occasion. Not only did Steve and Tim hit it off at both an intellectual level and a personal level (both, it turned out, enjoyed a range of dangerous sports), but the entire lower high table joined in the conversation, mesmerised by the idea that pigeons might become confused by roundabouts. Questions were asked, suggestions were made. The salt cellar became the pigeons' home loft. Knives and forks were lined up to make particular points. The participants in the rather staider lunch going on at the upper high table must have wondered what was going on.

As a direct result of this meeting, Tim and Steve applied for, and were awarded, a grant of over £400,000 from the EPSRC (the Engineering and Physical Sciences Research Council) to study the pigeon's 'map' in more detail. They jointly supervised a research student and published 3 papers in prestigious scientific journals together. A further joint grant is now being considered by the BBSRC (Biological and Biotechnology Research Council) and two more papers are in press.

Within Somerville, Steve Roberts has found a further application for the statistical methods of engineering by working with Sarah Gurr, Fellow in Plant Sciences, on the analysis of microarrays. These are tiny "chips" upon which are printed sufficient "data" to allow scientists to follow changes in the expression levels of thousands of genes after a variety of treatments. Sarah and Steve have been exploiting several statistical methods to analyse and display these data in a way that will inform biologists about future experiments. Their collaboration means that they now share the supervision of two cross-disciplinary D.Phil students.

* In case you were wondering, all lunches at Somerville are teetotal! Editor

Josephine Peach and Daniel Anthony have been working together on a medical imaging project. It all started from a conversation between them at lunch. A patent has been taken out which results from this collaboration, and further developments are planned.

Sarah Gurr has also teamed up with Michael Hayward, Fellow in Inorganic Chemistry, to test a most unlikely-sounding idea: that fungi can do a better job of synthesizing metal oxides than the best chemists. Metal oxides are essential in mobile phones, computers and in a variety of optical devices but they are difficult to synthesize in the laboratory because so far the only way this can be done is at very high temperatures. Fungi, however, make them at room temperatures. They very effectively precipitate manganese oxide from solution, producing crystals that are much more structured than the amorphous results of the standard methods of production. The fungi appear to use a completely new form or phase of manganese oxide so Sarah and Michael's work (which is now also funded by the EPSRC) opens up the possibility that fungal chemistry could be used to make a whole range of new materials.

Chemistry of an even more biological sort features in the collaboration that Sarah has with Jim McDonnell (Fellow in Biochemistry) on trying to get electricity out of fungi. Jim's technical expertise has already helped Sarah's group to unlock the fuel cell potential of fermented yeast as part of the Leverhulme funded Oxford Biofuel Cell Project (with Fraser Armstrong, ICL, Fellow of St John's). Sarah and Josephine Peach (Fellow in Organic Chemistry) found a joint interest not just in gardening but in the science which goes with it. Together they wrote the scientific material for several gold medal-winning exhibits by the Oxford Botanic Garden at the Chelsea Flower Show, on Medicinal Plants, Plant Colour and Making Sense of Plant Scents. They have also written articles for the general public, including one on Saffron in *Country Life*.

To complete the circle, Steve Roberts and I are collaborating on a BBSRC funded project (£400K) to improve animal welfare on farms, by bringing together statistical techniques from engineering with data collected from commercial farms. One of the first welfare issues we are applying this to is the serious problem of feather-pecking in flocks of laying hens . This is much more of a problem in free-range and non-cage flocks than it is in battery cages because the habit spreads much more when birds are kept together rather than separated in cages. Video cameras inside chicken houses will allow us to analyse the movements of the birds statistically, we hope to develop an early warning systems for outbreaks of feather-pecking or indeed any signs that something is wrong, such as outbreaks of disease. The unlikely similarity between the chickens that I work with and

the particles that Steve works with first appeared as a possibility over a Somerville lunch and is now turning out to be closer than either of us thought.

No-one really knows much about the conditions under which scientists, or indeed any researchers, do their best work. Most science departments, however, are now focussed on 'metrics' – measurements of performance, such as the number of papers published, the number of citations of papers by other people, the grant income earned or even 'markers of esteem'. There is continuous scrutiny of peoples' work in these terms, not just the Research Assessment Exercise, but yearly rehearsals, and pre-RAE assessments, in which people are told they are not making the grade and that their work is of 'national' rather than 'international' standard. So focussed are departments on how well they will do in the RAE that they instruct people which journals to publish their papers in (the ones that are most likely to be cited, of course), set them targets of output, grant income and so on. How wonderful, then, to be able to come into College and talk in a relaxed atmosphere about what really matters – the research itself. There is a real joy in being able to explore ideas that may sound (and may indeed be) far-fetched or implausible and to be able to draw parallels between disciplines that may or may not lead anywhere. Nothing is lost by having a pleasant lunch-time conversation about an cross-disciplinary idea that is never going to get off the ground. But there is everything to be gained from asking if it just might fly. Perhaps, in the absence of really understanding what produces the best research, a judicious mixture of sticks and carrots is the best bet. Science departments, with their pressure on metrics and the more specialised collaborations they foster, provide the sticks and one sort of carrot. But colleges, by being a community of friends and colleagues appointed for their very different specialisms and not under any pressure to be multidisciplinary if they don't want to be, provide a complementary environment in which unexpected ideas can – and do - grow. One of the best of those other sorts of carrot is undoubtedly lunch at Somerville.

I genuinely don't know whether Somerville is unique in its collaborations or whether a similar case could be made for other colleges, perhaps in the arts and humanities or between arts and sciences. If it could, I hope it will be. Our future as a collegiate university must lie not in emphasizing the differences between colleges but in making the case for the college system as a whole. We need to state, loudly and clearly, that colleges are not expensive historical accidents leaching money from the University but part of what makes Oxford the University that it is. They contribute educationally, intellectually and financially and, as the Somerville experience shows, they can bring people together in multidisciplinary interactions that other universities can only envy. But we do need to say so.

Development Department, Somerville College, Woodstock Road, Oxford OX2 6HD
Telephone 01865 280626 www.some.ox.ac.uk