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Chemistry at Cambridge Newsletter

Spring 2008

Teaching the chemists of the future

Complex shapes from simple molecules

Probing the properties of porphyrins

What's next for Cambridge chemistry?

Bill Jones took over as head of department last year, and Sarah Houlton asks him how it's going, what's next for the department, and whether he still has time to do chemistry

Was the job of head of department what you were expecting?

Well, there's a lot more paperwork and bureaucracy than I'd anticipated! And the financial side is also quite complicated with regard to university funding and how it impacts on the School of Physical Sciences and the department. It's important to make sure the department can do the science that it wants to do, and that the tremendous work that's going on receives the necessary support. We are a highly successful department with very strong research groups doing extremely well in terms of grant income and attracting good PhD students, postdocs and academic visitors. But the downside of this success is that there's always the issue of space, and being able to provide the facilities needed for the existing and future science.

It's great to see the Melville lab getting an extension to develop polymer chemistry, and it's good that we've been able to provide our new appointments (Matt Gaunt, David Spring, Stuart McKenzie, Oren Scherman) with good facilities and opportunities. It is also good that areas of the department that have not been refurbished for many year are brought up to the modern standards required of today's science, such as the surface science labs where Stephen Jenkins and Dave King have their groups has been recently upgraded, and the labs for David Spring.

What's the next phase of development going to be?

We are working very hard to get the necessary resources to develop the old radiochemistry labs in the south basement. There's a lot of space down there we could use, but it can't be used at the moment because of radiochemical and asbestos contamination. The university is trying to help us on that, and things are promising. It will be a major job, but the result will be a space that we'll be proud of, and where people will be happy to work. It takes a lot of effort as it involves so many different people – the university has a big financial input, Estates Management because of the need for building works and contractors, and of course there's the safety aspect, particularly because of our asbestos legacy.

I think it's important we continue to maintain and develop the building as there is lot of good science going on and more we want to do. There is a steady stream of people coming to me saying they need more space as they've been given another major grant. It's a problem – but a good problem as it's a sign of a healthy and thriving department.

How's academic recruitment going?

We have made important appointments of young staff. More recently it's been interesting to be part of the recruitment of Daan Frenkel as head of theoretical, (replacing Jean-Pierre who contributed so much to the health of the sector) and the appointment of John Pyle to the 1920 Chair of physical chemistry. These appointments have given us an additional impetus in terms of research in computational chemistry and atmospheric science, recognising our strengths in these two important areas.

And I'm hoping that we will soon be able to put the facilities together for the new Geoffrey Moorhouse Gibson professorship. We are also now, with the School of Clinical Medicine, looking to appoint the Herchel Smith professor of medicinal chemistry. This is particularly exciting as it will reinforce our already strong links with the Clinical School.

What about on the admin side?

We've been making some important changes to the way the department is administered. It's great that Andy Middleton is now formally the buildings manager, and the university has just approved a senior computer officer post with overall responsibility for computing and IT facilities within the department. I would hope to be making an appointment here soon. That's a really positive step as we're so dependent on IT and computing!

Sue Johnson's retirement presents difficulties as she had been with us so long and was so important to us. She will be hard to replace, but I'm optimistic. Sue had a wide-ranging role with responsibility for support staff, safety and security – a role that had evolved historically rather than necessarily logically. I've tried to redefine that role so that the new person can focus on working with support staff in terms of job development and progression and so on.

As I see it, there are five important facets to the smooth running of the Department and our ability to do good science – safety, finance, teaching, buildings, and very importantly the people. Howard Jones looks after the finance side and academic affairs, along with Christine Wilson; Andy the building; Mags Glendenning safety (now with the assistance of a safety technician); James Keeler on the teaching side; and, hopefully, we will soon have the new support staff person to replace Sue.

What else have you learnt in your new role?

It's been great to become more aware of the varied science that's going on in the department. It's all too easy to focus on your own area of research and not really know what everyone else is doing. Finding out about what goes on here has been rewarding because we're a good department and, by and large, people are tolerant of the fact that there aren't always instant solutions to problems. Very often taking the time to make a decision rather than rushing it means you can come to a better solution. I think most people understand that, and realise that instant gratification isn't always the best way!

So do you still have time to do chemistry?

My work in the Pfizer Institute for Pharmaceutical Materials Science is still going well. We continue to look at ways of developing new methods to produce drug products, and the key driver here is to decrease the time it takes between identifying a good drug molecule and getting it into the marketplace to the benefit not only of the pharmaceutical industry but also the patients who need the drugs. I think Pfizer appreciate the quality of the work that's come out of the institute, and the work that we've done. The strong links between my group and both the Cambridge Crystallographic Data Centre and the department of materials science are also very important. In just over four years, we have produced 100+ first-rate publications.

I'm also still teaching – this year I've given lecture courses at Part II and Part III level, and I'm still supervising my own courses as well as basic first year physical chemistry. It's great at the end of a busy day talking about finance and buildings and so on to sit down with enthusiastic young undergraduates and talk about chemistry! I hope I will be able to continue doing that as it reminds me what the department is actually about – doing great science, and developing the chemists of the future.

CV Bill Jones

Born: Mold in North Wales. 'It's Yr Wyddgrug in Welsh, and that sounds a lot better!'

Status: Daughter, Sarah, who after a psychology degree at UCL, has started as a graduate management consultant trainee in London with Capgemini Consulting and a son, Matthew, studying Music Technology at De Montfort, a course that Bill find really interesting and makes him envious!

Education: First degree at Aberystwyth, followed by a PhD there with John Meurig Thomas and John O. Williams

Career: After a year at the Weizmann Institute in Israel, Bill returned to Aberystwyth, where he was on the academic staff for two years. He then moved to Cambridge with John Meurig Thomas in 1978

Interests: Reading, music, Goss china, and Dewi – the family black Labrador.

Less familiar

Dear Editor
Thank you for another interesting issue. I was particularly glad to find among the 1950s faces a number of familiar faces from my generation.

Sandy Ashmore would be one whom you describe as 'rather less familiar', a fair comment since he left Cambridge in 1963, but generations of Emmanuel men will remember him with affection and gratitude, and I am one of your readers with fairly clear recollections of the Cambridge of 50 or 55 years ago!

For myself, as for many other nervous schoolboys, he was the first contact with Cambridge, interviewing me when I came up to write the scholarship exams, and subsequently being my tutor during my undergraduate years (1952-55).

Sandy (as he was universally known) had come up to Emma in 1934 and after completing his BA he began research on gas kinetics with Norrish (also an Emma man). His research was interrupted by service in the RAF, but he returned after the war to complete his PhD.

He was elected a fellow of his college in 1949 and, in 1953, was appointed lecturer in physical chemistry, where he continued research on gas kinetics and catalysis.

In 1959, Sandy moved from Emmanuel to newly founded Churchill College as tutor to advanced students, then in 1963 he left Cambridge to become professor of physical chemistry at the University of Manchester Institute of Science and Technology, serving some time as head of department. On his retirement in 1981, he returned to live in Cambridge, where he died in 2002. Unfortunately, he was a victim of Alzheimer's disease in his last years.

Brian Thrush will have known him well, both being members of Emmanuel College, and I've been referring to an obit by Brian in the college magazine to check my dates. In my first year, 1952, when he was a graduate student, Brian was my supervisor in *organic* chemistry!

Now back to the puzzle section. I'm still fretting over dubnium. They shouldn't go changing the names of the elements!

All good wishes, Christopher Willis
107 Runnymede Crescent, London, Ontario N6G 1Z7, Canada

Intensive study

Dear Editor
Re Portraits of the 1950s: Dr Ashmore was very helpful to me at Emmanuel in a challenging task. Going up in 1957, I had undertaken, under the ICI Bursary scheme (about which I wrote to *Chem@Cam* some years ago), with only O-level maths, a year's intensive course in maths, physics and chemistry, administered by the university. This was to qualify for the natural sciences tripos in 1958, instead of the modern languages tripos for which I had originally gained admission.

I completed Part I in two years and graduated in 1960, then Part II chemistry in 1961 with the help of his successor as director of studies in chemistry at Emmanuel, Brian Thrush. During this time, I attended lectures from Sir Alexander Todd (later, after being ennobled, sometimes called Lord Todd Almighty), Professor Longuet-Higgins and Professor Norrish. Subsequently, I joined Shell and came across Morris Sugden. Many familiar names in your articles!

Yours sincerely, Basil South (Emmanuel 1957)
9/69-74 North Steyne, Manly, NSW 2095, Australia

chem@cam
Chemistry at Cambridge Newsletter

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Cover

Jo Hayward, who works for Dominic Wright, using the new glovebox in the third floor lab. Luckily for us, it's see-through!

Photograph:
Nathan Pitt and Caroline Hancox

This newsletter is published three times a year by the University of Cambridge Chemistry Department. Opinions are not necessarily those of the editor, the department, or the university.

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Symposium wows the crowds

Back at the end of November, the department hosted a pilot postgraduate symposium for the Royal Society of Chemistry's biological and medicinal chemistry sector. Nine students gave talks on their work, along with three guest speakers from industry. There were also 25 poster presentations.

The event was entirely sponsored by industry, and more than 150 students from a variety of universities and research institutes attended. Industrial talks were given by Trevor Perrior of Domainex, Andy Barker from AstraZeneca, and GlaxoSmithKline's Trevor Grinter.

The committee chose which students were to give talks, and two of the nine were from Cambridge – Nicola Gardner from Ian Paterson's group, and Veit Waschowlowski, who works for Steve Ley. The £250 prize for the best oral presentation went to Mandy Bolt of the University of Leeds.

GSK's Trevor Grinter

Photos: Nathan Pitt

Trevor Perrior of Domainex

'We felt that while traditional organic chemistry students were well catered for with events like this, there were far fewer opportunities for those working in chemical biology and medicinal chemistry,' explains Dave Alker, a consultant in chemistry recruitment who was heavily involved in the event's organisation, along with our own Rebecca Myers and Gordon Saxty of Astex. 'We were overwhelmed by support for the event, and more than twice as many students came than we had anticipated!'

The event was such a success that it's being repeated this year, and will again be held here in Cambridge.

Double success at Pfizer poster bash

Winners Gemma and Rob, flanked by head judges Tony Barrett from Imperial College (left) and Pfizer's Mark Bunnage

Two Cambridge chemists were joint winners of the annual Pfizer poster competition, held last December. Open to all final year chemistry PhDs, applicants submit and abstract of their work and the best 30 are picked to present a poster at a day-long symposium in Canterbury.

After a day being grilled by both academics and Pfizer chemists, Gemma Veitch of Steve Ley's group and Rob Pace, who works for Matt Gaunt, were chosen as the winners. Gemma's poster featured her work finishing the synthesis of insect antifeedant azadirachtin, and Rob's focused on his work developing a novel asymmetric transformation and its use in complex molecule synthesis.

To complete a fine day for Cambridge chemistry, two further students from the department were among the four runners up – Alison Findlay from Ian Paterson's group, and another Gaunt student, Donna Wilton.

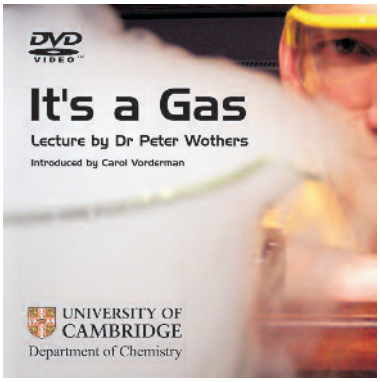
Solid state collaboration

Melinda Duer is part of an EPSRC-funded consortium to install a national 850MHz solid state NMR facility at Warwick. The collaboration also involves scientists from Warwick, Nottingham, St Andrews and Glasgow, and while the lion's share of the money for the £4.2 million project comes from EPSRC, money is also being put in by BBSRC and Warwick University.

'It will make a huge difference to my science,' says Melinda. 'For example, I will be able to observe ^{43}Ca in bone and synthetic bone materials – it's just not possible to look at this difficult quadrupolar nucleus at lower fields. It will give us much more detailed information on the nature and structure of the mineral in bone and, in particular, diseased bone such as in osteoporosis.'

She adds that the prospect of being able to do natural abundance ^{17}O spectra is also very exciting. 'This means we should be able to study hydrogen bonding in biological and other systems directly, so we can really start to look at what holds some of these systems together.'

If you missed last year's Science Week lecture by Peter Wothers, don't worry! A DVD is now available. Contact Sheila Bateman on reception, email sb293@cam.ac.uk for more details



Stop press: another Open Day triumph

This year's open day, held on 15 March, was another resounding success, with conservative estimates putting the number of visitors at 2500.

From Pete Wother's lecture, 'Free range chemistry' (pictured below), the CAS/BAS climate change and the RSC fuelling the future activities, to the slime pond, the plated coins and the crystal growing, there was something stimulating on offer to all of them, young and old.

Thanks to everyone in the department who helped out – and look out for a full report on the day and loads more pictures in the next issue of *Chem@Cam*! And pencil in next year's provisional date – 14 March.

Photo: Nathan Pitt

In loving memory of Alex

Photo: Nathan Pitt

John Emsley and John Hopkins enjoy a drink after the lecture

On 7 March, John Emsley delivered the inaugural Alex Hopkins lecture to an enthusiastic audience of department members and visiting sixth-formers.

Alex Hopkins was a much-loved college teaching officer in inorganic chemistry who died in 2006 at the age of only 31.

John Hopkins, his father, has founded this series of lectures to celebrate Alex's life, stipulating that the lecture should address the role of chemistry in society and should also reflect his son's sense of humour.

John Emsley's lecture, entitled 'Better Looking, Better Living, Better Loving: what's chemistry got to do with it?' fitted the brief perfectly, in addition to acting as a good plug for his book of the same name.

Jeremy Sanders would be very pleased to receive suggestions for the 2009 lecture, which will be held during the Cambridge Science Festival.

University challenged…

Every year, teams of students battle it out to beat their fellow universities and colleges at TV quizzery on the long-running BBC show University Challenge. Many of the teams are Cambridge and Oxford colleges, but it's not often that Cambridge chemists get a look in. But this year was different, as the Trinity Hall team contained two, both of them undergraduates – Part II student Dennis Waller and Part III student Joe Moëd.

Joe explains that there was a quiz in college last year to get on the team, with the top four being picked. 'In fact, there were only seven applicants, and one of the original team had to pull out, so they only had to beat a total of two other people to make it!' Joe says. Despite that, they did really well once they made it on screen.

The first round was filmed in Manchester last June. 'We beat St Cross, Oxford, whom no-one had heard of, by 255 points to 110,' Joe explains. 'The second round was filmed soon afterwards in July, and we had another comfortable victory, beating Worcester, Oxford by 220 to 50.'

There was then a huge wait for the quarter finals, which were filmed in December. 'We narrowly lost to Manchester by 195 points to 150,' he says. 'We were level early on, then they got four or five questions in a row right and took a 100 point lead. We managed to claw much of it back, but it wasn't to be.'

The show's questionmaster is the famously fierce interviewer Jeremy Paxman. 'We didn't get to talk to him much,' Joe says. 'He'd come over just before the match to say a quick "Hi chaps, good to see you again," and commiserations or well done afterwards. But in July we were the last match of the day, so when we went back to the waiting room to get our stuff, we got to have a quick chat. He was actually quite gentle, though I was a bit awed by him as he's intimidatingly tall!'

Joe says he really enjoyed the experience, and never expected to do at all well. 'I think the best moment (sad but true!) was getting an email from Frank Duckworth, co-creator of the Duckworth-Lewis method in cricket, congratulating me on my speedy interruption! And we managed not to make too much of a fool of ourselves, though not listening properly to my teammates – or the question – and answering "1885" to a question about housing law under Thatcher, wasn't my most brilliant moment…'

What makes their achievement all the more impressive is that they were all undergraduates. 'I think we acquitted ourselves quite well in the end, going out in a tight match to the largest university in the country, especially when they were all PhDs and three of their team were over 30!'

A German special guest at JMT's 75th

Sir John Meurig Thomas celebrated his 75th birthday in December with a symposium in his honour. And among the eminent chemists in attendance was someone who's now better known for things other than her chemistry – German chancellor Angela Merkel.

The two first met when John was director of the Royal Institution in London, and he even published a joint paper with her husband, Joachim Sauer, another chemist who was one of the speakers at the symposium.

Other luminaries who spoke at the event, which was held at Fitzwilliam College, included the university's vice-chancellor Alison Richard, president of the Royal Society Lord Rees, and the opening lecture was given by Nobel laureate Ahmed Zewail.

Right: John and Chancellor Merkel; below, the two-day scientific symposium attracted a host of chemists

Photo: Nathan Pitt

Corporate connections

The winter Corporate Associates meeting in early December attracted a good number of our industrial partners.

Three members of staff gave talks on their work. Oren Scherman spoke about dynamic functional materials and new ways to assemble block copolymers. Matthew Gaunt's talk was about new catalytic strategies for chemical synthesis. And Stuart Warren gave (probably) his last lecture in Cambridge ahead of his retirement at the end of the year, with a talk entitles 'Synthesis of heterocycles by rearrangement'.

Photos: Nathan Pitt

Clockwise from left: Matt Gaunt, Stuart Warren and Oren Scherman in speaking action

Photo: Nathan Pitt

This year's Linnett Professor is Susan Solomon of the US National Oceanic and Atmospheric Administration. She gave two lectures, on climate change and ozone depletion

A publication frenzy

The end of February was a great week for Cambridge Chemistry in the journal Angewandte Chemie – unusually, five papers from our academic groups were published together.

Two were from Ian Paterson and featured the synthesis of spirastrellolide A methyl ester; one was by David Spring, on the discovery of an anti-MRSA agent using diversity ortiented synthesis, and two more were from Jeremy Sanders, one on an unexpected receptor for C_{70}, and the second on recognition of DNA G-quadruplex targets using dynamic combinatorial chemistry.

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Thanks to the generosity of the department's Corporate Associates, we have been able to benefit the education and environment for students and staff. For example, the Associates pay for university-wide access to SciFinder Scholar and ChemOffice. They also make significant contributions to the library for journal subscriptions. Moreover, they provide exam prizes, faculty teaching awards and summer studentships, and have recently funded the refurbishment of a state-of-the-art meeting room with teleconferencing and display facilities.

Corporate Associate membership not only provides essential support for the department, but also provides numerous benefits to help members work with us and achieve their business objectives. Members enjoy many benefits through their enhanced partnership with the department, such as:

- Visibility within the department;
- A dedicated meeting room and office for members to use while visiting the department;
- Invitations to recognition days and networking events at the department;
- Access to emerging Cambridge research via conferences, special briefings and various publications;
- Access to the department library and photocopying/printing facilities;
- Regular communications about upcoming events and colloquia;
- Subscriptions to Department publications, including *Chem@Cam;*
- Priority notification of and free access to departmental research lectures;
- Ability to hold 'Welcome Stalls' in the department entrance hall;
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- The full services of the Corporate Relations team to facilitate interaction with students, staff, and other parts of the University of Cambridge to help achieve your corporate objectives.

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The Big Experiment

Science is all too often perceived as difficult by schoolkids, with those who aren't inclined to concentrate in class switching off and paying no interest. But what would happen if they were given lessons that were deliberately designed to show that it's actually a lot of fun? Could they be enthused by science – and by learning in general? That was the premise for the TV show The Big Experiment that was recently shown on the Discovery Channel. And several Cambridge chemists played a pivotal role in the programme.

Filmed at the Royal Docks Community School in Newham, east London, over six weeks in the summer term of last year, the aim was to try and get a group of 19 largely disaffected kids through a GCSE science exam a full 18 months early. Three scientists – our own teaching fellow Peter Wothers and teaching technician Chris Brackstone, plus Liverpool physicist Laura Grant – were parachuted into the school to show that science can be fun.

'The programme producers contacted me through the Royal Institution because of the lectures I've done there,' Peter explained. 'They also wanted a technician, and I thought Chris would be ideal, and they agreed. A third Cambridge chemist was also involved – teaching technician Mark Hudson, who does a lot of the hard work for the Science Week demonstration lectures here, also came with us to help set up the experiments, but he didn't want to appear on camera. But he was crucial behind the scenes.'

Peter says the producers of the programme had deliberately picked a very challenging bunch of kids. 'Some were quite keen and enthusiastic, but as a whole the group was hard work,' he says. 'There were a few of them whose attitude could easily bring down the whole class. That's the sad thing about it – while they may not have many opportunities, when they do get one they don't take it. We'd set up a really fantastic experiment and they were more interested in going home to play on their X-box.'

FANTASTIC CHALLENGE

He adds that getting such a difficult group of kids interested in science was a real challenge. Chris agrees. 'It seemed like a good idea and a lot of fun – until we met the kids on the first day of filming!' he says. 'We gave them a test at the beginning, and they had no clue about anything. There was one lad who had never done any homework – or any work for that matter – but he was a nice, intelligent young chap. Getting kids like him through a GCSE was pretty amazing.'

In the first episode, Chris was wired up and given small electric shocks by the kids, and when the producers realised he was game for it they took full advantage. 'The electrocution was really painful!' he says. 'It was all downhill from there. They got Peter and me to go into a freezer at –120°C for three minutes, and I also had a go in a stunt plane to experience zero gravity, which was amazing as I'd never flown before.'

But the highlight for him was definitely being set on fire. 'I've set myself alight before, but never deliberately! They had a real stuntman there to help, and I had to wear cold gel layers underneath the clothing because it gets very hot. Then there was a fireproof suit, and a couple of pairs of overalls, and then they started filming. Laura set light to me, the flames reached the ceiling, and it was terrifying! You're not allowed to do more than 15 seconds as it gets too dangerous after that, and you have to keep moving as otherwise you'd cook. Right at the end I managed to flick my arm and set light to my eyebrows, but fortunately there are no permanent scars, even if my eyebrows are a little thinner now!'

Other highlights on the experimental front included calculating how many helium balloons are needed to keep their classmates in the air – which was tested out from a 50m platform in Alexandra Palace – and a large number of explosions. In another impressive one, the wall of a theatre was covered in light-sensitive paper and the kids posed in front of it, magnesium powder flares were set off, and the flash left their silhouettes behind on the paper. Peter says that even the grumpiest of the kids failed to hide the fact that they were impressed at that one. Setting off all the fire alarms with the smoke helped there!

CAN'T BE BOVVERED

At first, the kids really didn't respond to the experiments, but by the fourth week they really started to get through to them – the fact that the most disruptive girl was thrown off the project had a lot to do with this. Peter adds that it's a real shame that too many of the kids had a 'can't be bovvered' attitude, and it would have been a very different experience if they'd been working with a group who all actually wanted to learn.

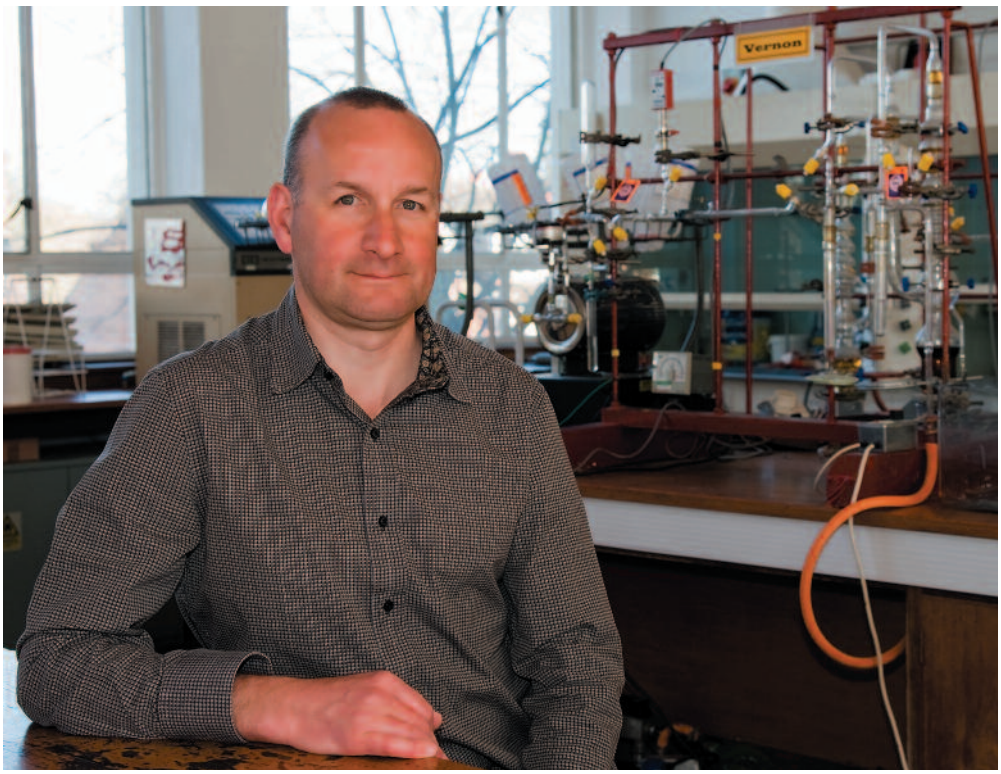
The kids sat their science GCSE exam last November, and – miraculously – all of them were awarded a pass. 'They were entered into the foundation level exam so the maximum grade they could achieve was a C,' Peter explains. 'One got all Cs, which was really good, and the rest all passed with grades down to a G.'

The final fling for the show was a ceremony where TV presenter Myleene Klass ('I'd no idea who she was!' Peter claims) handed out the certificates. But he believes that the biggest achievement wasn't simply that they all passed, but that they really weren't expecting to and it will have given them confidence that they could do well when they take all their GCSEs next summer. 'I think that will make a big difference in their futures,' he says. 'Usually, they would realise it was too late to start working when they got to their exams. Now, having seen what is possible by taking this one early, I hope they will put in a bit of effort to take them seriously when they come around for real.'

Peter Wothers, Laura Grant and Chris Brackstone, ready to face the east London kids

Teaching the chemists of to

Undergraduate teaching is an essential part of the department's work, and there have been big changes in how it's done in the past decade – many of them driven by director of teaching James Keeler



Photos: Nathan Pitt

James Keeler has been the department's director of teaching for almost 10 years now, and during that time he has overseen some dramatic changes in the way students are taught, and the external background that drives what they study. There are also many more external pressures these days than there were even a decade ago.

'The environment has changed a lot in terms of the amount of external scrutiny there is of our teaching, and people are a lot more interested in what we are doing,' he says. 'Fortunately, thus far Cambridge has always come out well in terms of student experience ratings, and we are lucky not to have a recruitment problem for new students.'

However, where the department faces competition is in ensuring students want to carry on studying chemistry once they are here. 'Because of the way the natural sciences course is arranged, about 500 of the 650 first years choose chemistry as one of their three options,' he says. 'As well as the ones who arrive thinking that chemistry is the subject for them, many of those who want to be physicists will do chemistry, as will those with an eye on biology.'

While this means that the department is pretty much guaranteed large numbers of first year students, it raises big issues for teaching. 'The audience is extremely heterogeneous,' James explains. 'There are some people who are very physics and mathematically minded and don't really like qualitative subjects, whereas there are those whose focus is more at the life sciences end of the spectrum and who will run a mile if they're faced with a string of equations. Trying to teach in a way that keeps all of them interested and engaged is something of a challenge!'

It does mean that while recruitment of students into the first year isn't a problem, keeping them interested in chemistry is something that has to be tackled. 'The natural sciences course is a classic Thatcherite-style internal market – our major recruitment drive is internally during the first couple of years of the course, so it's essential that our teaching really engages the students,' James says. Because the students aren't studying chemistry full time for the first two years, there is a careful balance to be made between teaching the basics and more advanced topics.

It's really important to get the basics right, or there is the danger that too many will become disengaged and pick other subjects in the following year instead. There is a careful balance to be achieved between keeping the good students who already think they want to study chemistry interested, and the work not being too difficult for those who are less confident. 'It's a very difficult thing to get right. It's easy to teach to the top 1%, but if we only did that we'd end up with very small numbers by the third year,' he claims. This is one area where the Cambridge system helps – the good ones can be stretched within their supervisions, rather than in the lectures where there are 500 students with many different backgrounds and interests in the class.

Typically, in the second year about 150 choose chemistry as one of their two courses, and in the third year, where they focus on just one subject,

CV James Keeler

Born: Aylsham, north of Norwich in deepest Norfolk, where he grew up on a small family farm. 'I'm the second son, so I didn't get the farm, for which I'm deeply grateful!'

Education: He went to the local grammar school, and from there to Oxford to study chemistry. He stayed for a DPhil with Ray Freeman on new techniques in NMR, including the delightfully named WALTZ-16 method of broadband decoupling.

Career: James moved to Cambridge in 1984 with a 'New Blood' lectureship, and ironically Ray Freeman moved to Cambridge shortly afterwards. James been here ever since as, now as a senior lecturer, and has been director of teaching since 1999.

Interests: His two great loves outside his work are arthouse cinema, particularly foreign films, and distance running. 'I run a long way, but slowly! I've done three marathons in the past, but I've decided now that it's too painful, so I tend to stick to running along the tow path by the river for an hour and a half.'

Did you know? At school, James was a keen radio ham, and with a couple of friends built a parabolic dish aerial on his father's farm. 'It was 40 feet across, and was quite a local landmark,' he recalls. 'We used it to bounce signals off the moon, where the round-trip delay is two seconds, so you could hear your own voice having been to the moon and back. At first, we used to keep all the transmitters and receivers in my father's car trailer underneath the dish, so when he wanted to take the pigs to market, we had to dismantle it.'

morrow

chemistry will retain about 100. About three-quarters of these tend to stay on for a fourth year. 'The big drop-off in numbers is in the first two years, where they scatter to other subjects,' he says. 'The hope is that they go into those subjects having had a decent grounding in chemistry.'

Another issue is the wildly varying differences in maths skills between the new students. 'A significant number of the first year class have only done AS-level maths, and some of them haven't even done that, and so their mathematical abilities are quite limited,' he says. 'But, of course, some of them will have done double maths A-level, and we have to address this whole audience. However, there is another problem – schools tend to teach maths and science as completely isolated subjects, and even in A-level physics the amount of maths they now use is very limited. So, if anything, a bigger issue is the fact that they have no idea how to apply the maths that they do know. Making a mathematical description of a chemical or physical problem is not necessarily obvious to them, and we have to go very slowly until they get used to the idea.'

TEACHING THE BASICS

James does most of his own teaching to the first- and second-year students. 'I like teaching the basics, and it's important that this is done well,' he says. 'I teach thermodynamics to the first year – while it's very important, it's probably the least popular subject – and in the second year I teach statistical thermodynamics, another subject people tend not to like!' This year, he's also started another new course, teaching third-year students the physical basis of NMR. 'It's much more close to my research interests, and – very conveniently! – is based on the textbook I published on the subject in 2005. It's been a while since we had a course that addressed the technical side of NMR, rather than how it works in practice. But there isn't too much maths in it!'

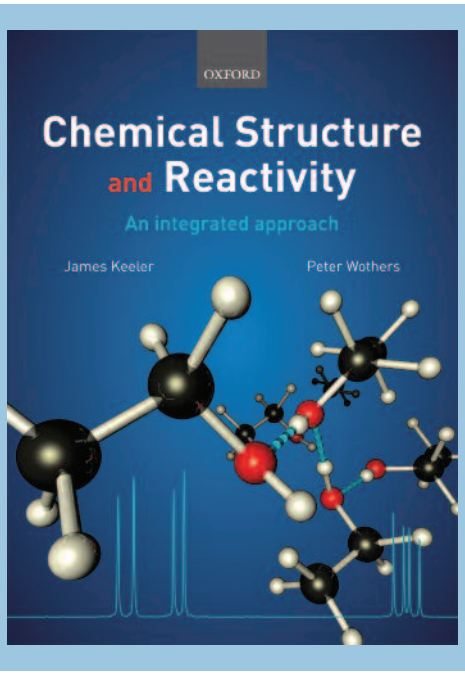
The post of director of teaching has its roots in the first round of government teaching quality assessments back in 1993. At that point, James was chairing the teaching committee, and the assessment process made him realise that he really wanted to devote more of his time to departmental teaching. His current role grew out of that, and the realisation that it would be a good thing to charge someone with overall responsibility for the teaching side. It is a model which has been adopted by a number of other science departments in Cambridge.

'We realised we needed people who were dedicated to teaching, initially looking at the practical courses, and this made us realise that there was a lot to be said for having staff members whose primary focus was teaching – and who were good at it,' James explains. 'So we employed Peter Wothers and Bill Nolan with this in mind, and more recently Deborah Longbottom and Sally Boss have been appointed to formal joint college and department teaching positions, spending half their time in each. As all of these people have strong college connections they help to keep the vital links between the department and the colleges alive and strong – something we must not at any costs loose'

The next challenge teaching within the department will face is that in 2009 students will start to arrive whose A-levels will have been under the new specifications ('They don't call it a syllabus any more!' James says) that have been introduced recently. 'One of the things we're going to start doing over the next year is take another good look at the course, as we'll have to ensure it matches their prior experience of chemistry,' he says. 'It will be essential to check that we're not expecting too much of them, or assuming they know things that they don't. That is exactly the sort of thing that puts even the best students off. If they think we don't understand and appreciate what they know it makes for a very bad relationship with the students. What they arrive here knowing has changed a lot over the past few years. We don't control the secondary education system so we have to meet the kids where they are when they arrive here as first years, and that means we're constantly having to update our own courses to match them.'

A NEW CHALLENGE

James himself is about to face a new challenge, too – in September 2008 he's becoming senior tutor at his college, Selwyn. 'I'm going to switch to half time in the department, and as senior tutor I'll also be in charge of the academic and pastoral side of the college, across all subjects,' he says. 'There used to be a time when people would take on this role in addition to their existing activities, but with the increased scrutiny from outside it's become a much bigger job and it's not possible any more. Because I'm not also running a large research group, and with the latest textbook finished, I'm confident that I will have enough time to carry out both roles effectively. We shall see how it works out!'



A lot of James' time in the past couple of years has been taken up by a new textbook project. The latest book he and Peter Wothers have written, 'Chemical structure and reactivity – an integrated approach', is due to be published in June, much to their relief.

'It's designed to accompany the first year of a chemistry degree course,' he says. 'But it's very different from any previous first-year textbook – the idea was that we would weave organic, inorganic and physical chemistry together with, for example, bonding discussed in one section rather than different ones depending on which aspect of it was being covered.'

This is a fresh approach for teaching chemistry. James says that teaching tends to keep the different topics in their own boxes, and they are trying to break the mould.

'All the organic chemistry focuses on the orbital perspective rather than being merely empirical, and thermodynamics and kinetics are both back-connected to organic and inorganic chemistry.'

Probing porphyrin properties

Photo: Nathan Pitt

Nick Bampos: applying NMR tricks to study dynamic properties

What's going on when porphyrins are protonated, and could this complex aromatic structure be used as a core for catalysts? Nick Bampos is trying to find out

Several common molecules with important biological functions, such as haemoglobin and chlorophyll, contain porphyrin analogues. These large aromatic structures have been the subject of a lot of chemistry effort over the years, and these days they are popular subunits for creating macrocyclic structures, but there is a lack of basic understanding of some of their properties. This is one area of chemistry which Nick Bampos is addressing.

'The core of the porphyrin macrocycle can be protonated, but the mechanism for this protonation and how it distorts the system is not well understood,' he says. 'People have been working on porphyrins for the better part of a century, yet much of the fundamental background to their behaviour is poorly understood. The best work in this area was done 30 or 40 years ago, and now we're using the advances that have been made since then in NMR and mass spec to understand the protonation process better, and maybe even try and fine-tune their synthesis.'

He's also trying to use them to create supramolecular assemblies using a variety of different metals, inspired by nature to mimic natural systems. Ideas include an attempt to make synthetic haem analogues (with Paul Barker) that could be used as molecular wires; these could perhaps be 'plugged in' to proteins to see if the proteins could be made to communicate with each other photoelectronically.

One problem with supramolecular chemistry is that complex mixtures of products are often formed, which can make characterising them something of a challenge. 'Organic chemists have been attaching reagents to polystyrene beads for years to make separations easier,' Nick says. 'We thought it might be possible to build a supramolecular assembly around a bead, making it much easier to filter everything else off leaving just the assembly and the bead behind.'

SOLID SUPPORT

By applying simple NMR tricks, they can make the solid support disappear from the spectrum, making it possible to characterise the assembly's dynamic properties as well its structure. This works because the bead itself does not 'move', but the ends of the molecules that are not attached to the bead are swimming around in the solvent so the spectrum of the beads can be removed.

Another idea is to use a porphyrin core in catalysis. The catalysts used in important industrial reactions like asymmetric hydrogenation commonly contain phosphine ligands coordinated to the metal ion. 'We're making porphyrin systems that have phosphine "arms" attached to them, so that each porphyrin will bond to more than one metal,' he says. 'This would bring the metals much closer together, so perhaps one metal might tether the organic starting material, while another might selectively deliver a reagent.

At the moment they're making model systems, but they have managed to attach phosphine arms in the right place. They're approaching the task in a very systematic way – adding first one phosphine, then two, then four, to see how many metal ions can be coordinated around the same porphyrin and then whether it has any catalytic activity.

BIG ASSEMBLIES

With all of these assemblies, the big problem is purification. 'You are taking a single building block and adding it to itself to make a big assembly, which means they are tricky to separate from the starting materials as they have very similar chromatographic properties,' Nick explains. 'So you have to create clever tricks to isolate what you want from what you don't want, and then to get it sufficiently pure to study. Symmetry is another big problem – by NMR, a monomer, a dimer and a tetramer would look pretty much the same. The fantastic mass spec facilities we have in the department are really helpful here!'

CV Nick Bampos

Born: Sydney, Australia

Status: His partner is Jon Burton, who recently moved from Cambridge to Oxford's chemistry department

Education: Studied chemistry at the University of Sydney, and stayed on for a PhD with Les Field investigating C-H bond activation with iron and ruthenium phosphine complexes

Career: He came to Cambridge in 1993 for a one-year postdoc with Jeremy Sanders. 'It has turned out to be a very long year!' he says. He's now an ADR in the department, and also spends a lot of time in his college, Trinity Hall, where he's Senior Tutor and director of studies for natural sciences. Last year he was elected to the University Council so spends a fair bit of time serving a number of University bodies.

Interests: He loves cinema, and is a regular visitor to the arts cinema in Cambridge. He also likes reading, good television and radio, but claims that his life has been a crusade against all sports activities. 'Maybe that's why I never went back to Australia – I've failed miserably at being a good Aussie!'

Did you know? When Nick came to Cambridge for that postdoc, he'd lined up a place at law school back in Sydney for when he returned. His dreams of a career in law seem to be on permanent hold…

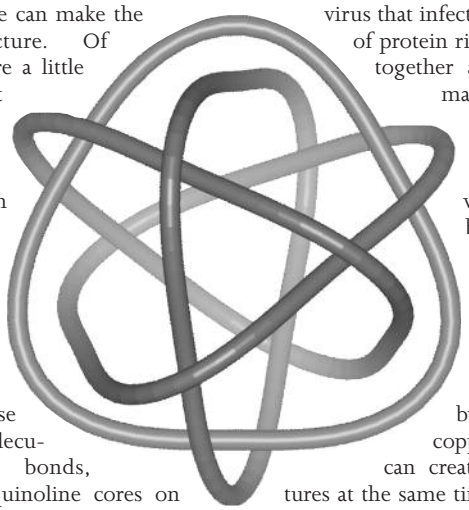
The shape of things to come

Jonathan Nitschke is using metal ions and small molecules to try and mimic some of the complicated assemblies that nature creates

Nature is extremely skilled at arranging atoms and molecules in complicated shapes and patterns, such as the tertiary structures that proteins fold up into. Jonathan Nitschke is looking at ways of making molecules assemble together in ways inspired by some of the complex arrangements found in nature.

'We're using fairly simple building blocks to create these complicated structures using different kinds of self-assembly reactions,' he explains. 'Generally, there's a metal template which the organic molecules organise themselves around to create a well-defined structure, which might be a helix, or a square, or it might even be a one-dimensional wire.'

Copper ions are often the starting point for creating assemblies. 'It's a little like a house of cards, where just a couple of cards don't stand up on their own, but when you put a lot of them together the whole structure is quite stable,' he says. 'The metal helps the molecules arrange in unusual ways like this, and we're interested in how complicated we can make the whole structure. Of course, they are a little more robust than a house of cards!'



He's collaborating with Ivan Huc from Bordeaux on a project to make helical structures from chains of quinoline molecules. These form intramolecular hydrogen bonds, stacking the quinoline cores on top of each other in a spiral arrangement. 'We've found that by adding amino groups to the ends of these quinoline chains, they can also come together around a metal template in a very well-defined way, where two helices which wind in different directions will sit together quite happily.'

This is what happens when they use copper; if iron is used instead, then the helices form parallel to each other rather than perpendicularly. 'We can control the tertiary structure of these analogues of proteins by using different metals, and different structures could lead to different functions, as with proteins.'

He's also interested in creating assemblies with complex topologies by using more than one different metal ion at the same time. 'The idea is to create four identical loops which are interlinked, with each one threading through each of the others exactly once,' he says. 'Each loop is also symmetry-equivalent to the others, so you can turn the structure around and they would still look the same. If we succeed, these will be the most complex topologies that have ever been created using synthetic building blocks!'

PRACTICAL APPLICATIONS

There are practical reasons for creating structures like this, however, quite apart from the fact that they are very beautiful. Nature uses topologies in very interesting ways, and Jonathan wonders whether these assemblies might have important uses. 'The capsid, or protein shell, that surrounds one particular virus that infects bacteria, consists of protein rings that are linked together a little like chain mail, providing the virus with very robust protection,' he says. 'If we were able to build a structure like that, then anything we put inside would be very difficult to get at.'

He's found that by using iron and copper together, they can create different structures at the same time from a pool of building blocks, with iron picking out some of them, and copper going for others. 'The trick now is to get them to act together within the same structure, with iron creating one kind of linkage, and copper another. We've already had some success, but there's a long way to go yet!'

Other self-assembled structures that he has managed to create include cages with a well-defined space inside into which molecules such as cyclohexane will fit. 'While this isn't hugely exciting in itself as cyclohexane doesn't do very much, it is very tightly held inside the cage,' he says. 'If you take the cages out of solution the cyclohexane stays inside them, and unless you add something like a triamine or an acid to open the cage it will stay there. So we can unlock the cage at will, and if we were to swap the cyclohexane for a small drug molecule, it might be a way to deliver the drug to a very precise part of the body. The building blocks are well-understood and have low toxicity, and they also might be able to penetrate barriers in the body that the drug molecules themselves cannot.'

Photo: Nathan Pitt

Left: The topology created by four identical loops, each of which threads through each of the others exactly once

CV Jonathan Nitschke

Born: Syracuse in upstate New York

Status: His partner Natalie Sordé is a French chemist, who was just finishing her PhD in Geneva when Jonathan arrived there. She's moved to Cambridge with him, and is currently job-hunting

Education: High school in Gainesville, Florida, followed by a degree in chemistry at Williams College in Massachusetts. He then moved to Berkeley, California for a PhD in organometallic chemistry with Don Tilley.

Career: He moved to Strasbourg in 2001 for a two-year postdoc with Jean-Marie Lehn, and was then appointed to a fixed-term lectureship at the University of Geneva. After four years in Switzerland, he moved to Cambridge as a lecturer last October.

Interests: Jonathan and Nathalie have discovered the joys of walking on the Fens, and they also go mountainbiking – not that there are many mountains locally! They're also having a great time exploring all the cultural delights that London has to offer.

Did you know? You'd never guess it from his accent, but Jonathan is actually Australian, thanks to his Aussie dad. But he's only been there once – when he was 10.

More faces of the 1950s

Here's some more reminiscences prompted by Antony Barrington Brown's photos. More contributions welcome!

Dear Editor,
Professor FJW Roughton was the second and last professor of colloid science, in the department which had been founded, with help from industrial sources, for Professor EK Rideal. At the time that Roughton was appointed, he and Hartridge had probably made the fastest measurement of a chemical reaction, the reaction between haemoglobin and CO_2 or CO (I am not sure which).

Every now and then, Roughton and his personal assistant, Edwards, would have a week of experimentation during which period one was strongly discouraged from raising administrative matters! Roughton was one of the first to use computers (the original Cambridge EDSAC in the 1950s) to analyse the kinetics of simultaneous reactions. I, and my infrared group, worked for several years as a postdoctoral fellow in Roughton's department before I was appointed as ADR in spectroscopy in the chemistry department, at the time that the move from Pembroke Street to the new buildings in Lensfield Road was made.

RGW Norrish was the second professor of physical chemistry, after Lowry, and shared a Nobel Prize with George Porter (both in Cambridge) for the invention of flash photolysis – again at that time the fastest technique for measuring photochemical reactions. Norrish was a somewhat abrupt person and insisted on physical chemistry being administratively independent of the rest of what was then called the University Chemical Laboratory. This became rather tiresome after 1955 when both departments were located in the new building complex in Lensfield Road – for example, it required separate stores and tearooms!

The department received its present name when, after the next two professors of physical chemistry, it was recommended and agreed by Senate that the two departments should merge. At the time when chemistry was in Pembroke Street, the physical chemistry and colloid science departments were located in adjacent buildings in Free School Lane around the corner. This was named after a very early school with a Jacobean hall, the latter then forming part of physical chemistry.

JH (Jack) Shulman was a reader in Rideal's colloid science department at a time when monolayers on surfaces, of what we now call surfactants, were new and exciting interests. I think a Langmuir trough for measuring their properties is in the background in Schulman's photograph. With A.E. Alexander, another lecturer in Rideal's department who had moved as professor to Australia, they investigated the possible role of monolayers in reducing evaporation from Australian lakes during droughts. Shulman was also successful in the US in seeding clouds with silver iodide microcrystals in order to induce rain – only to find that farmers further downwind sued the earlier one for stealing their rain!

Ralph Gilson came from Manchester with Todd as laboratory superintendent in Lensfield. He had detailed and fruitful interactions with the architects as the new buildings were constructed. I believe that a set of photographs of all the innards of the buildings were taken by him and must be available somewhere within the complex. He also advised Todd on the construction of the laboratories themselves and on equipping them for modern chemistry.
Yours sincerely,
Norman Sheppard
5 Hornor Close, Norwich NR2 2LY

Vodka burette?

Dear Editor,
RGW Norrish was head of the department of physical chemistry when I was researching for a PhD in reaction kinetics in 1956/7 under Moelwyn-Hughes, famous for his work on the partition function. My supervisor and Norrish were not on speaking terms, but I got on well enough with Norrish and he once confided in me, whilst dispensing vodka into my glass from a burette at a department party, that if I stuck with him he would tell me the fourth law of thermodynamics. He never did but I suspect it is Murphy's Law (years later, in 1991, I made a film about Murphy's law for BBC1; it was broadcast the day the Gulf War started).

Norrish did not get on well with Todd, either. Todd was an Olympian figure; his students hung a huge banner across the front of the newly finished Lensfield Road labs with the inscription 'There is no other Todd but me!'

Sandy Ashmore was a lecturer in the physical chemistry department and also senior tutor of the newly founded Churchill College. He had a very poor opinion of architects and came into the lab one evening to tell us he had just returned from inspecting the building of the new Churchill College to find you could not close the lavatory doors from the inside unless you stood on the lavatory seat. The architect was unfazed by this.

The physical chemistry department was still housed in the Old Cavendish Laboratory on Free School Lane in those days and was very independent, it only moved to Lensfield Road later. We all met for coffee in the Perse Library every morning, which had a cohesive effect on the department. The latest PhD theses were usually on display on the table, and about 150 to 200 pages long. An old boy came in one day, picked a thesis up. 'What's this?' he said. 'In my day a chap could to say all he wanted to in 10 pages or so.'
Ian Fells (matric. 1952), emeritus professor of energy conversion, Newcastle University.

From the top: FJW Roughton, RGW Norrish, Jack Schulman, Ralph Gilson and Sandy Ashmore

A much loved man

Dear Editor
I must say a few words about my director of studies, Sandy Ashmore, who died five years ago in Lea near my home town Gainsborough. I attended the funeral of a family friend in Lea not long after – attended by his son-in-law – and was able to pay my respects. The epitaph on the headstone read something like: *Much loved by Friends, Colleagues and Associates*. I wanted to add… and by Pupils as well.

One abiding memory is a summer evening party in Chapman's Garden, Emmanuel. Sandy was well into his second glass of a 'black frothy drink with bubbles. 'This is rather nice,' he said. 'What is it?' I told him it was a Black Velvet, which prompted the question, ' And what's that?' I had to explain it was champagne and Guinness. Most of us in those days had spent two years in National Service – I had been bar officer in my Officers' Mess in Hong Kong – so we were often more experienced in wines and drinks than our teachers!

Sandy was a very good lecturer – in fact better than his more illustrious colleague, Professor Norrish (mind you I remember drinking whisky with him at one of our early Emma reunions – with him you did not want to compete!). Of course the highlight of our final year in the new lab, only open to undergrads that year (1956/7), was Alexander Todd proudly producing the original Crick & Watson DNA bench-top model – with suggestions that this might provide us with the very secrets of life itself! What a long way we have come since then.

I kept in touch with Sandy over the years through our best man, Roy Fields (Queens', 54-57), who was at UMIST with Sandy. I saw him once in retirement but then we 'lost him' with his sad final illness.
Regards, David Buck (Emmanuel, 1954-1957)
124 Parkway, Welwyn Garden City, Herts AL8 6HN

A look back to the 1940s

Never mind the 50s, it's time for the 40s! Mary Ashworth, an undergraduate here at the end of the war, sent in this photo of her Part II class. Are any of her classmates reading this? Let us know!

From the left, back row: O. Rutherford, ? Webb, J. Sawyer, V.M. Clark, H. Platt, W. Rosenfelder, H. Frenkel, W. Burne, M. Ashworth; Middle row: ? Imam, ? Edeleanu, ? Sutton, ? Poyntin, R. Lewis, ? Cave, ? Kimberley, ? Webber, A. Sharpe, P. Gray, A. Wild, D. Goodison; Front row: S. Neuberger, J. Banus, B. Whittaker, Leslie Hunt, A. Hutchinson, Ernie Elborn, A. Free, J. Turner, S. Wickham-Jones.

If you can fill in any of the ?s – or are in the photo yourself – we'd love to hear from you!

I have enjoyed reading the various reminiscences of former members of the chemistry department recently published in *Chem@Cam*. Although I am of an earlier generation (Newnham 1943-46), I thought some of my contemporaries might be interested in this group photograph of the Part II chemistry class of 1946 – please note how tidily undergraduates dressed in those days!

We were fortunate to have very good supervisors and lecturers, including some very distinguished professors. I remember particularly Delia Agar (Newnham physical chemistry), Fred Dainton, Professor Emeléus, who made inorganic chemistry so much more interesting than the textbooks, and the impressive Professor Todd, who explained to us his work on the structure and synthesis of vitamins. Miss Muriel Tomlinson came from Oxford to teach organic chemistry. At her first lecture, 300-plus undergraduates, having rushed up the dusty stone stairs of the Downing Street labs, signed the attendance register, then greeted her with a spirited chorus of 'She'll be coming round the mountain'.

Later, Dr Dainton taught us physical chemistry. He organised practical classes most efficiently, and was really helpful in sorting out mistakes and unexpected results in a constructive and kindly way. However, he could go on and on at times… He lectured on Tuesdays, Thursdays and Saturdays from 12pm to 1pm and, having filled the blackboard with line after line of formulae, he rarely finished until after the hour. We were all very hungry, and many were planning sports activities. So, one Saturday, as the Roman Catholic church clock struck 1pm, Peter Gray stood up, uncorked a bottle of beer and handed it, with a glass, to Dr Dainton. The rest of us opened our brown paper bags and proceeded to eat our sandwiches. His response was, 'I perceive that this is a put-up job,' returned to his blackboard, and continued until 2pm!

I named all the members of the class when the photo above was taken; but what has become of us? The two older men on the front row are Leslie and Ernie, our superb lab technicians, ever resourceful, helpful and cheerful. They worked very hard for us. Some of my fellow students have now died, others have retired. Some became distinguished research chemists in universities in this country and overseas. Peter Gray became professor of physical chemistry in Leeds, then returned to Cambridge as Master of Caius. Malcolm Clark became professor of organic chemistry in the University of Warwick.

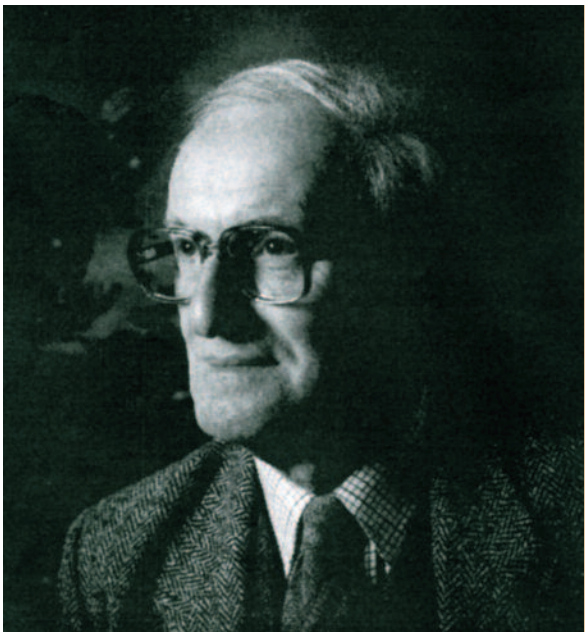
Several of us became schoolteachers – I did, also Audrey Free, Jean Sawyer and Beryl Whittaker. I taught chemistry and general science in Watford and in Nottingham. In 1960, I became the first Head of Hatfield Girls' Grammar School – later to become Bishop's Hatfield Girls' School, an all-ability school. I was able to call upon Cambridge colleagues and former pupils to help Hatfield girls when making decisions about careers. We had science open days, too, but not as spectacular as that shown on page 12 of the Summer 2007 *Chem@Cam*!

I really enjoyed teaching science to youngsters of all ages. In Nottingham, there were large A-level groups; in Hatfield, my repertoire widened to include human biology, religious and social studies, and general studies, focusing on scientific discoveries, science and religion. I enjoyed planning and running the school, too.

Yours sincerely, Mary Ashworth
11, The Quadrangle, Welwyn Garden City, Herts AL8 6SG

These marvellous whiskers belong to Doug Blackwell, who was the technician in the radiochemistry lab until his death in the early 1970s. The photo was sent in by Clifford Price, a PhD student of Alfie Maddock's between 1969 and 1972, who is now professor of archaeological conservation at the Institute of Archaeology at University College London

A chemical educator



Martyn Mays and Catherine Housecroft recall Alan Sharpe, who died in January

I first came to admire and respect Alan Sharpe when I attended his first year inorganic lecture course as an undergraduate in 1957. His lectures revealed his critical analytical intelligence and were a model of clarity. They presented inorganic chemistry as a topic for which it was possible to offer rational explanations supported by quantitative experimental evidence rather than as a series of unrelated facts connected by a few waves of the hand.

He was an excellent and bewitching supervisor of undergraduates who instilled those he taught with the same enthusiasm for and critical approach to inorganic chemistry which he possessed. Many of the brightest students wanted him as their research supervisor when they stayed on to do their PhDs, but he always made sure that those he took on did so with their eyes open.

Alan's own early research in the 1950s had been experimental, and he quickly developed a reputation as a fluorine chemist mainly through his work on bromine trifluoride (a noxious substance causing nasty burns) as an ionising solvent which could be used to prepare complex fluorides. Alan was, however, ultimately less interested in pushing back the frontiers of chemical knowledge than in understanding the facts that already lay within the frontiers. He was not a hands-on supervisor and those who worked with him were required to develop an independence of thought and action which, for most, stood them in good stead in their later careers. But he did not shy away from the problems encountered by his students and was always on hand to offer sound advice when it was sought.

His output in terms of published papers was limited but he was widely respected within the inorganic research community by virtue of his inorganic textbooks and his chemical wisdom. Through his writing he helped to bring about the renaissance of inorganic chemistry in the 1950s.

Alan was always stimulating to talk to about chemical and non-chemical topics. He knew what was important in chemistry and often helped researchers in other groups put their work in perspective. On receiving the news that a new metal cluster with 17 metal atoms and a novel geometry had been synthesised, he was sometimes able to persuade the giver of this news that a small step for a chemist rather than a giant step for mankind had been accomplished.

His passion for chemistry was matched only by his passion for music, and for the music of Mozart in particular. Annual visits to Salzburg for the Mozart festival were mandatory and his students were encouraged to obtain a musical as well as a chemical education. Invitations to accompany him to Glyndebourne were issued generously, even to the tone deaf.

Alan was a well organised person with great administrative talents. No task was too large or too small for him to take on and any request for his help was committed instantly to the postcard which he always carried around in his pocket. The postcards were never lost and the requests were always honoured. He was much in demand on university committees and when, in the 1960s, someone was required to chair a committee charged with reforming the Natural Sciences Tripos Alan was the obvious person. Vested interests were involved, and by quiet persuasion and common sense Alan was able to ensure the interests of the university as a whole were given pre-eminence and that the desired reforms were achieved.

He was for many years a capable senior tutor of Jesus College and it is rumoured that, when Lord Lewis was asked to be the first warden of Robinson College, his acceptance of the post was conditional on Alan Sharpe agreeing to become the first senior tutor. This Alan did for the sake of the university and the success of Robinson College is due in no small measure to his huge contribution in setting it up.

Alan was a private man, but he was wholly dedicated to the welfare of his large family and immensely proud of their achievements. His wicked sense of humour endeared him to everyone and, when once asked for the names of two of his grandchildren, he informed the enquirer with the usual twinkle in his eye and slight twitch of the mouth that they were Attila the Hun and Boadicea.

RIGHT OF REPLY

His wit manifested itself in every area of his life and, at his retirement dinner, he remarked that 'such occasions are like a memorial service at which the corpse has the right of reply'. Of the chemical literature he once said 'What you think is important about a research paper is seldom the same as what the author thinks is important about it.'

It is sometimes said that knowledge is knowing that a tomato is a fruit. Wisdom is knowing that it is not a good idea to put it in a fruit salad. Alan had that wisdom in spades and contributed it across a wide spectrum of endeavours. He was always stimulating and fun to be with and he will be sorely missed by those who knew him. *Martin Mays*

When I arrived in Cambridge in 1986, Alan Sharpe was already, supposedly, retired. Sharpe's Inorganic Chemistry was a core text for inorganic teaching in Cambridge and through its use in lectures and tutorials, I became aware of Alan's educational prowess. Alan was a true gentleman, one of the old school of academics who always had time to think about science and ways in which to explain chemical principles to undergraduates. He was well respected within the inorganic chemistry community in Cambridge, and in particular, by generations of undergraduates in Jesus and Robinson Colleges.

In 1996, having moved to the University of Basel, I was approached by Longman to join with Alan in a project that would update and modernise Inorganic Chemistry. Alan was delighted to be back at work again, and we settled into an easy partnership which was to last for over 10 years. Alan quickly agreed that the project would only be efficently managed if I worked at the computer (something he never did!) and he read and commented upon drafts. Alan was not one for email nor, if it could be helped, faxes. Therefore, we relied upon regular post for communication between Cambridge and Switzerland. To chemists in the 21st century, this may seen unbelievable, but somehow, it worked.

The results of our collaboration were three editions of an internationally recognised textbook that has been translated into both German and Spanish. The third edition was published in November 2007, and I am only too pleased he was able to see the final production – he was very relieved when the advance copies arrived. Alan's ability to discuss all aspects of traditional inorganic chemistry, in particular solution thermodynamics, into his mid-80s were unfailing. His role as a chemical educator live on in Housecroft and Sharpe, Inorganic Chemistry. *Catherine Housecroft*

A man of contrasts

Ian Fleming remembers David Husain, who died in December at the age of 70

How often have you said, or had someone say to you, 'I'm sorry I'm late; I bumped into David Husain'? I can see him now, in my mind's eye, standing too close, and hear him, in my mind's ear, scrupulously asking if I hadn't heard the story before, saying '…bear with me…', as he stretched a story out. But we wouldn't all remember him with such affection if *The Ancient Mariner* were the whole picture. David could be exasperating, yes, but he was also interesting – what he had to say always had a point, and was usually worth stopping for.

He was a man of contrasts. Let us start with the fact that he was born in Grimsby to a Muslim father, an Indian test cricketer, and a Jewish mother of Russian extraction. He had an unsettled childhood: in Cambridge as a baby, living in Pembroke Street just across the road from the College; most of his early childhood was in Grimsby; and then at school in London. Perhaps this was what made him glad to fashion for himself, with one exception, a singularly stable adulthood, living in Cambridge for most of his life, almost all of it in the College.

Another contrast was that he was a serious physical chemist, but also a keen reader of European history. Blessed with a formidable memory, he could recover in great detail salient material from many sources within his library of 7000 books. He had to be forbidden from even mentioning the name of Bismarck at high table for several years. He marched against Suez in his youth, but was more conservative in later life, a believer in realpolitik.

Photo: Ian Fleming

David Husain: a fascination with physics and history, not just chemistry; Below: At a tree-planting ceremony in the 1970s

AWESOME REPUTATION

I met him in 1959, when he came, fresh from his first class degree in Manchester, to Pembroke College and the Chemical Laboratory to work as a graduate student for Professor Norrish. David had an awesome reputation, having carried out in Manchester a piece of research that was to be published during his first year here, something none of us could have emulated. He flourished, obtaining a junior post in the department in his second year and winning the Draper's Research Fellowship competition in Pembroke College for 1962.

He then became Norrish's assistant, his last, writing his papers and research lectures, running his group as it wound down, and starting his own work on the details of atomic reactions, stressing the reactivity of atoms in their higher energy states. This experience kept him safely in Cambridge, where he rose through the ranks – demonstrator in 1963, lecturer in 1968, and reader in 1986.

In 1966 he took his only long break to gain experience abroad, joining Bill Abrahamson in the Case Institute in Cleveland for six months. Even though he had been happy there it took a lot to persuade him, from then on, to leave Cambridge, but he did have trips to Ireland and Romania, to the United States to see family, and latterly to Spain and Oman. There was also his visit to the Dorchester to give his mother and stepfather his annual report. He regularly came back from that occasion to tell me that it was all right, he had passed his examination again.

But one of those occasions was special. Not only was it in Switzerland rather than London, but David was desperately ill. He had become skeletally thin, very dark skinned – why did we who did see him not do anything? I can only say we thought he was seeing a doctor, and he was certainly seeing a therapist, to help him to get over the trauma of his marriage, which had recently broken up, most unhappily, after less than a year.

His mother took one look at him and said, 'You must go home and see a doctor.' David came back to his therapist, and said, 'I'm not depressed; I'm ill.' Mercifully she agreed immediately, and referred him to an Addenbrooke's physician, who took one look at him and said, 'You have Addison's disease.'

The primary cause in David was a tubercular infection of the adrenal cortex, and the consequence was a loss of adrenal hormones. The cure was heavy doses of antibiotics for a year, and cortisone acetate for the rest of his life. It stimulated his only brief interest in organic chemistry, when he researched the history of cortisone acetate, and he was delighted when I was able to use this molecule in my first year lectures to explain IR spectroscopy, but also telling the students it was keeping one of our chemistry lecturers, unidentified, alive.

David lived with this regime for 30 years. His marriage and his illness took a substantial toll, and increased his resolve to lead a quiet life. 'Set not thy foot outside the College' became his motto, and he broke it only rarely, and finally on retirement two years ago, when he found a home over the road from the laboratory in Lensfield Road.

His graduate students and postdocs, like everyone else, respected his seriousness, his deep and careful thinking and his utter integrity. His work was about as different from my own as it can be for two chemists. We both worked with carbon and silicon, but the similarities end there. He regarded my molecules as large cumbersome beasts about which nothing serious could be known, whereas he was interested in the much more fundamental properties of single atoms and small molecules.

CHEMICAL PHYSICS

As a chemical physicist, he was proud to be a Fellow of the Institute of Physics. His work on iodine, on oxygen and on the alkali metal atoms was hugely influential, stimulating major work in atmospheric and interstellar chemistry.

He was courtly in an age when few are. He never properly got to grips with computers or cars, yet he was a whiz dealing in shares, a pastime that occupied him, especially on behalf of the Philosophical Society, during his too brief retirement. Characteristically, he looked at the deeper influences rather than the day-to-day whims of the market.

He made carbon copies of his notes as he gave his first-year supervisions, so that both supervision partners would have copies. He was reluctant to take on responsibility, but painstaking to excess in carrying it out, making copies of every bit of correspondence connected with his being senior examiner, or in his role as chairman of the University Radiation Safety Committee.

My relationship to David was tangential. I never spent long with him, and I only saw him for brief exchanges, more often than for most people, to be sure, as we took the same routes from laboratory to College and back almost every day for nearly 50 years. Although this has been a personal account from what I have known of David, I am sure that I speak for everyone when I say that David was a dear man, and I miss him terribly.

A cake-tastic effort

We assume that the elements weren't major ingredients too…

When Chris Whittleston's girlfriend Manuela Solera-Deuchar started fundraising for a global exchange programme in Egypt with the charity Voluntary Service Overseas, he had a bright idea about how to help her raise more. Knowing how chemists like their cake, Chris, a PhD student in David Wales' group, made a periodic table of cakes and sold them to the hungry hordes in the Cybercafé.

Manuela's own efforts included a sponsored skip around every Cambridge college, no mean feat as the route was eight miles long.

She was hoping to raise at least £600, and that total has been surpassed. The contribution from Chris's bakery prowess came to a grand total of £132.82. That's a lot of cake!

Chris's first release

May will be an exciting time for Cambridge chemist Chris Forman – his band, the Winter Kings, will be releasing their first album, 'Gallows on the shore'. The band describes its music as 'lyrically interesting alternative music with a refreshingly intelligent edge'.

'I heard they were looking for a pianist from a mutual friend, so I went to see a gig of theirs,' he says. 'There were just two of them at the time, and we and had a chat afterwards. They "jamditioned" me in the Portland Arms a month later! I learned all their songs in one session, so they took me on as their pianist.'

Chris is in Paul Barker's group, and part of his work involves trying to artificially organise electron transfer proteins into a conducting network. Controlling the coupling between biological and solid state systems may enable biological functionality, such as enzymatic control or photoharvesting, hi-tech devices like sensors, batteries or computers.

'My PhD comes before the band, which is just for fun,' he insists. 'That's unless, of course, someone offers me millions of pounds to go on a global tour. But that all rather depends on whether or not people like the music!'

Comings & goings

New Staff

Sarah Njage

Leaving

Silvia Gonzalez-Calera

Keith Jenkins

Retiring

Susan Johnson

Bernard (Bernie) Simpson

One, two three, HEAVE!

The cabinet, for storing up to 75 litres of waste solvent, wasn't easy to get into the lab, but it's now in place, and probably not going anywhere!

How many workmen does it take to move a cupboard? Six, when it's as big as the 300kg one that's just been installed in the new Melville lab extension.

Always on the lookout for interesting shots, photographer Nathan Pitt spied them struggling up the stairs with a vast 90 minute fireproof cabinet.

The first floor lift wasn't big enough for it, and the scaffolding outside wasn't strong enough to hoist it up that way, so the stairs were the only option.

And it was even more difficult than it looked – the winding gear they were using to help them lift it broke, and it was stuck on the stairs for a couple of days while they found another one!

Photos: Nathan Pitt

Wind power in action

Photo: Nathan Pitt

Stuart's car (above) and Anthony's (right) didn't quite escape the wind unscathed

The destructive power of nature was brought sharply into focus at the end of January. Cambridge was having a very windy day, and photographer Nathan Pitt happened to be looking out of the window across the car park when he saw something moving that wasn't a car – it was a piece of cowling awaiting installation by the contractors that had been sitting by the main steps.

It shot across the car park, caught Stuart Althorpe's car a glancing blow on the way, and ended up wedged in the back of Anthony Stone's. His back windscreen definitely lost that battle.

Nathan scooted downstairs with his camera to shoot the aftermath, but custodian Tony McPherson had been too fast and had already shifted the cowling away from the car. But the damage it managed to cause as it traversed the car park was pretty impressive.

Christmas spirit

The staff Christmas party is always a good excuse to catch up with old friends over a drink or three. Caroline Hancox was on hand with her camera to catch all the old and new faces in action

Photos: Caroline Hancox

Clockwise from below left: Ian Fleming and Sijbren Otto; Mike Todd-Jones, Sue Johnson and Tony McPherson; Claire Rutterford and Emma Graham; Dave Spring; Mykola Karabyn, David Woollard and William Prist; Dudley Williams and Brian Thrush; Paul Skelton, Steve Wilkinson and Brian Crysell; Gabriela Ridlova, Elaine Stephens and Dudley Williams; Mike Sleep,Tony Gray, Jim Watson, Don Flory, Mike Ladds, Tiger Coxall and Dick Barton

Last issue's winners

Elementary crossword

Once again Graham Quartly's crossword setting skills attracted a good number of entries from readers. And correct answers came from the following:

Bill Collier (who congratulates Graham on another excellent puzzle, but takes issue with the spelling of 'nout' in 28 across – as every good Yorkshireman kno, it's spelt 'nowt', even in his Collins dictionary); Keith Parsons; Michael Aicken (on a fine postcard of Petty Cury in 1911 – rather more flat caps then than now); Paul Littlewood; Jim Dunn; A.J. Wilkinson; Richard Moss; Richard Brown (on a postcard of Garfield as Einstein, proclaiming his genius); Paul Stickland; Ian Potts; Roger Duffet; John Carpenter; David Isherwood (who completed the puzzle while digesting his Christmas dinner!); John Malone; Richard Butler (who says that even though it's now 23 years since he made a career change from chemistry into programming and systems analysis, he always enjoys receiving Chem@Cam and reading about what's going on in Lensfield Road); Robin Cork; John Billingsley; Norman Sansom; Michael Goodyear; Richard Chambers; Annette Quartly (who says she's still married to the setter, and that he still refuses to let her see the puzzles ahead of publication!).

And the winner is – chosen at random by my cat Ginola – is David Isherwood. Congratulations!

In case you're still bamboozled by it, here's the answers…

Across: 1 SAmOVAr; 6 BeAtNiK; 7 ArCO; 9 MoAt; 10 PAtHOs; 11 FeTiSH; 13 ORe; 15 CYbErNeTiCs; 17 LiGaNd; 18 ArOUSe; 19 ThIn; 20 SIMoN; 22 AsTaTiNe; 23 CoN; 24 COPTiC; 26 LaYEr; 27 BIrO; 28 PAl; 29 InNOCuOUS

Down: 1 SAt; 2 AmNiOTiC; 3 OK; 4 ArArAt; 5 WOOs; 6 BeAt; 8 CHAsTiSe; 9 MoNOLiThIC; 10 PHErOMoNe; 12 SYbArITiC; 14 ReGaIn; 16 NeUN; 20 STaTiON; 21 GeNErAlS; 22 AsPIrIn; 23 CoYPU; 25 OB.

Molecular rearrangement

No-one won Keith Parsons' molecular rearrangement puzzle – because no-one entered, not even any of our regular puzzlers. In case anyone is feeling reckless (or ashamed) that they didn't attempt it, here it is again. Several correspondents indicated that it was far too difficult, so let that be a challenge to you all! Here it is again...

Rearrange all of the letters used to spell the seven molecules listed below to give the names of seven other organic molecules. All are single word names, and there are no prefixes such as D- or iso-.

CAMPHENE ■ CHOLINE
INDANE ■ ISATIN ■ MENTHOL ■
RIBOSE ■ TOLUENE

The new group of chemical names have the following chemical types:

2 hydrocarbons ■ 1 polysaccharide
1 purine ■ 1 sugar ester ■ 1 ether
2 members of a homologous series

Hidden identity

Those with long memories (or addicts of this page, anyway) may remember that a couple of issues back the *Chem@Cam* filing system had failed miserably at locating the solution to Keith's Hidden Identity problem. Now I know you probably can't contain your frustration any further so here's Keith's explanation... Roger Duffett at least will be relieved!

And... the answer is Fibonacci. The letters used in the puzzle, excluding the title in lower case, are a rearrangement of the letters required to spell the names of the elements whose atomic numbers correspond to the first eight numbers of the Fibonacci series (1, 2, 3, 5, 8, 13, 21, 34). The stilted wording results from this restriction on the letters available. Poetic licence (!) is used to convert two of the Is into the number 2.

If anyone's still boggling at this, he's supplied a possible way of solving the puzzle... Read 'SIX AND II' as six and two (to rhyme with clue. This leads to the number 8. Lateral thinking then leads (via the word 'elementary') to eight elements. 'Letters-manipulation' suggests a rearrangement of the letters used to spell eight elements, probably the 57 upper case letters (because lower case letters are used in the title, which does not contain enough letters for eight elements anyway).

Some elements can be eliminated because their names contain letters not used in the puzzle. One has to find a series of eight elements that can be spelt with the 57 upper case letters used, which accounts for the stilted wording. The noun being sought could relate to a numerical series of eight numbers, and it contains nine letters. Numerical series can be arithmetic, geometric (too many letters and.or adjectives not nouns) – what about Fibonacci?! Try the simplest set first (occam's razor...) – the first eight – and the elements having these atomic numbers are spelt with the required letters. Hence Fibonacci is the required noun.

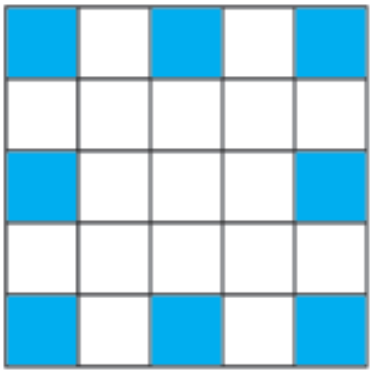
Keith adds that of the next numbers in the Fibonacci series, only 55 and 89 could apply to elements. Neither of these is ruled out at first glance because all the letters in their names are in the puzzle but they cannot, singly or combined, replace any of the first eight numbers and still give the puzzle information.

This issue's puzzles

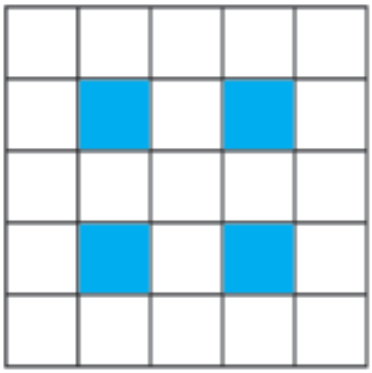
Elementary – but clueless

Graham Quartly's back, with more elementary crossword entertainment. This time he's supplied two puzzles – and no clues. Chemical elements are again placed in the boxes to form words reading across and down, but rather than making it easy by giving you clues, the idea is to arrange the sets of elements that are printed to the right of the grids so that each one appears once in each grid to make a full set of words.

All words will be found in a good English dictionary, and no proper nouns, such as FRaNCe are allowed. Good luck!



Al Ar B C C C
Ca Er He K Li N
Ni Ra S S V



Al Au C C Ce
Dy I Lu Mo Na
Ne P P Ru S S S
S Si Ti Ti

Secondary schooling

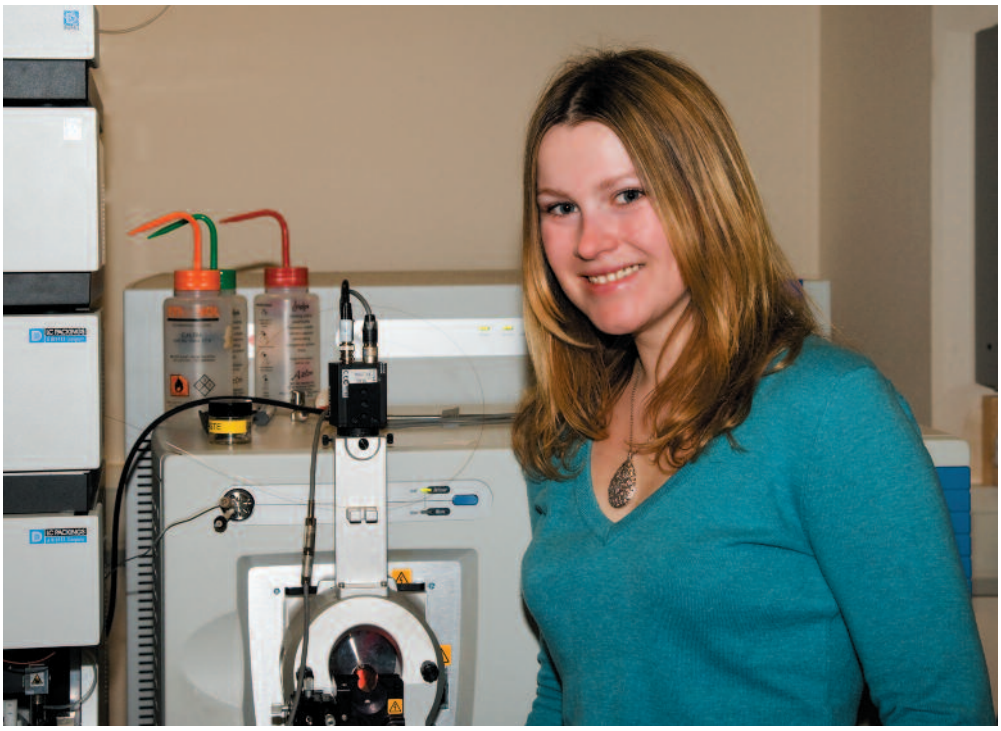
Here's another puzzle from Keith Parsons. And here's hoping it doesn't prove quite as difficult as his last couple! As ever, first correct answer plucked at random from all those that arrive in the Chem@Cam pigeon hole or inbox, wins £20.

And the puzzle... In a complete reversal of the usual sequence, Stuart, 63, who graduated in his early twenties, felt the need to improve his skills in basic maths. He enrolled in a cramming school which provided one-to-one tuition and where all the exams were marked out of a possible 200, in order to grade the pupils more precisely. He obtained 71.5% in Algebra, 62.0% in Calculus, 725% in Trigonometry and 65.5% in Statistics. What percentage did he obtain in Geometry?

£20 prizes are on offer for both puzzles. Send entries by email to jsh49@cam.ac.uk or by snail mail to *Chem@Cam*, Department of Chemistry, University of Cambridge, Lensfield Road, Cambridge

From the Czech Republic to Cambridge Chemistry

Photo: Caroline Hancox



Gabriela Ridlova: the Czech Republic's loss is Cambridge Chemistry's gain!

Gabriela Ridlova came to the UK from the Czech Republic for a short trip five years ago, and liked it here so much she stayed. And now she's found a home in our mass spec lab. Our roving reporter Don Flory met her

There's been a continuous flow of people coming to work in the UK recently, and especially from the central and eastern European countries since they joined the European Union – many of them bringing their professional skills and technological abilities. One such person is Gabriela Ridlova, who has been working as a technician in the mass spectrometry section within the department since the autumn.

She was brought up in the industrial city of Ostrava in the eastern part of the Czech Republic, close to the Polish border and about 150 miles from the capital city of Prague. 'All my schooling was spent in Ostrava, and I went on to read material sciences at one of the city's three universities,' she says.

'I specialised in the science of ceramics and glass as there were many companies working in this field in the Czech Republic. It was considered that your future could be very successful if you studied these subjects which, of course, involved a lot of chemistry.'

After she graduated in 2001, she carried on to study for a PhD at the same Technical University, but part way through she decided to suspend her studies for a while to travel to England – her brother had previously had a successful time learning English here.

'I had learnt a little English at school, so I thought this move would be a great opportunity for me to improve my English and, at the same time, experience the life and culture of another country. The plan was to come to England for three months and then return to Ostrava to complete my PhD. But it didn't work out like that – I've now been living here for five years!'

WONDERFUL CAMBRIDGE

When she first arrived in the UK, Gabriela lived in Hadley Wood, north of London, and spent a few weeks working as an au pair. 'But then I met someone who was studying and living in Cambridge, came here to take a look, and immediately fell in love with this wonderful city,' she says. 'I didn't want to leave!'

At first, she could only find a job in the catering trade, working in restaurants and cafés in the city, but when the Czech Republic joined the EU in 2004 and she didn't need a work permit, Gabriela started to look for a more permanent job back in science. And she succeeded – finding a position with Anglia Water at Huntingdon.

'I was involved with mass spectrometry, measuring quantitatively the amount of different metals in the water,' she says. 'Anglia Water supplies and treats water throughout East Anglia from three large reservoirs, although Cambridge receives its water from deep wells under the city.'

However, she was living in Chesterton, and the continual stress of the long drive to Huntingdon and back on the busy A14 every day, together with the somewhat repetitive nature of the work, led her to look for work nearer to home. And her application for a job in the mass spec lab here in Lensfield Road was successful.

'I like working here very much,' she says. 'And I've found the department, which I already knew was well thought of throughout the chemistry world, is full of so many interesting people.'

KEEPING IN TOUCH

Asked if her parents were concerned about her permanent move to the UK, despite her original plans only to stay for a few months, she said that when she first decided to stay, they were very disappointed. 'But now, they are very happy for me,' she claims. 'My mother has been over here to stay and likes Cambridge very much, but it's usually me travelling home to Ostrava so I can keep in contact with the family.'

In her spare time, Gabriela is a very keen Latin American dancer, and has been a member of a local Latin dance club for the past four years. She also enjoys yoga and swimming, and has travelled widely throughout Europe – and is particularly fond of Spain.

'I hope I will have a long stay in Cambridge and in the department,' she says. It cannot be easy for anyone to leave their family and friends to start a new life in another country in a different language, but Gabriela is relishing the opportunity.

Even the thermodynamics lectures left the students open-mouthed with excitement

UNIVERSITY OF CAMBRIDGE

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