Report on 30th International Symposium on Chromatography (ISC 2014), Salzburg, Austria, 14-18 September 2014

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At the close of ISC 2014 in Salzburg this September there was general all round agreement from delegates that the meeting had been a major success. Certainly the figures backed up that impression. In the order of 725 delegates attended. This was a step up from ISC 2012 in Poland (579 delegates) and, significantly, the attendees were drawn more evenly from a wider range of countries rather than there being a reliance on a strong local turnout. Interestingly there were 32 UK delegates. While this might seem high given the UK's reputation of being poor attenders at European separation science meetings, the figure was skewed in that most of these UK attendees were exhibitors. In total there were 25 exhibitors, including sponsors. Also present were 8 'media partners' including ILM. There were 81 oral presentations and 570 poster presentations. Of note was the diversity of activities as per recent trends with time being given over to tutorial sessions (11 seemed on the high side for these), panel discussions and short courses. 60% of the delegates were from academia with 40% from industry. 200 students attended, suggesting that the meeting was not only 'Communicating Separation Science for the Future' but also communicating to and through separation scientists of the future. This is an outcome with which the organisers would be very pleased. However, the quality of the science and its effective dissemination to the audience is the ultimate arbiter of whether a meeting has worked. The meeting was no let down on this score either with telling contributions from the good number of 'big names' packed into the scientific programme. Gert Desmet and Dan Armstrong featured in tutorial sessions and Pat Sandra and Jeremy Nicholson gave the Sunday night opening plenary, the latter presentation in keeping with recent ISC tradition being more multi-disciplinary in nature. (The list of 'big names' was much longer but to give a longer list might offend aspiring 'big names' who found themselves not on the list!)

UK separation scientists did not feature in abundance on the ISC 2004 scientific programme but the shortage in numbers was more than made up by the quality of the speakers. Following Pregl Medal Award winner, Pat Sandra, Jeremy Nicholson (left) (Imperial College) closed the opening Sunday night plenary session of the programme with his talk on "Meeting the Analytical Challenges of Systems Medicine and Molecular Phenotyping" at the Sunday evening plenary session. On Tuesday morning, Tony Edge (right) (ThermoFisher) spoke with great clarity and enthusiasm on "A Novel Approach to Low Volume Sample Preparation". David McCalley (University of the West of England) has, of course, turned speaking at conferences into something of an art form. He enthralled his packed audience not only with the rigour of his latest investigations on HILIC but also his dry, typically English humour in an interlude consisting of a few choice ascerbic comments on separation science funding in the UK which featured a passable imitation of of HRH Queen Elizabeth II!

At just about every stage of the development of separation science it has been possible at symposia to identify an emerging topic about which there has been a 'buzz' (over recent times, UPLC, fused-core shell technology, HILIC, UPC^2). Such a topic was not immediately apparent from the programme but on closer inspection it could be seen that 2D-LC is now 'lifting-off', albeit it has been around for about a decade (or even further back depending on what you wish to define as its real beginning). The two Wednesday oral sessions on 'Multidimensional Techniques' were dominated by 2D-LC. This was supplemented by a very-well attended tutorial session given by Peter Schoenmakers and the Monday vendor lunchtime seminar from Agilent. Indeed it is the recent (2012) availability of off-the-shelf 2D-LC equipment from Agilent ('The Agilent Technologies 1290 Infinity 2D-LC Solution') which ought to herald a much wider use of this hyphenated technique.

The set-up is compatible with existing Agilent modules for the first dimension, including even 1100 modules and now comes with a new 2D-LC valve, easy-to-use software for system configuration and 2D-LC method development and new software for enhanced data visualisation. The seminar concluded by raising the prospect of Agilent's instrumentation facilitating 5D separations i.e. 2D-LC / ion mobility / QToF. Schoenmakers' talk on 2D-LC not unnaturally drew heavily from his own work but he was very generous of his acknowledgement and provision of references to the work of other key scientists in the field. He emphasised the need for orthogonality of selectivity of the two dimensions. While this can generally be the Achilles heel of 2D-LC it had not been so much of an issue for his own work on polymers as he had used size exclusion chromatography (SEC) as his second dimension. He demonstrated peak capacities obtained in the order of hours that would have taken 3 years to obtain by 1D-LC. In concluding his session he gave honourable mentions to the likes of Stoll and Carr (plant metabolites; 30 min run time at 1 peak per second)), Haddad, Villiers, Torres, Mondello and Davydova, covering application areas such as peptides, surfactants and food (anthocyanins in red lettuce). He noted that while NPLC x RPLC covers a very wide range of analyte polarity it is more difficult to perform.

ISC 2014 was not just about lectures and posters. Very popular were tutorial sessions with topic overviews delivered by internationally acknowledged authorities such as Dan Armstrong (ionic liquids), Gert Desmet (kinetic plots), Caroline West (SFC), Imre Molnar (separation modelling), Christian Huber (separation techniques in bioanalysis), Luigi Mondello (2D-LC) and Peter Schoenmakers (2D-LC). Also there were panel discussion sessions such as that above on super-critical fluid chromatography (SFC) and lunchtime vendor seminar sessions.

Poster competitions for young scientists have now become a major feature of international separation science conferences and this was very much the case at ISC 2014. As ever, Gerard Rozing was the mastermind and facilitator of the competition and is seen above (far left) with the eight winners and Dr Bjorn-Thoralf Erxleben (European Chief Executive of competition sponsors, Shimadzu (Europe)) (second from right) and Michael Laemmerhofer (ISC 2014 Co-Chair) (far right)

Schoenmakers himself commented that his talk had been geared to a student audience and he had been surprised to see some more mature separation scientists in his audience. However it is clear that such tutorial sessions are suitable for those wishing to quickly get up to speed with a particular area of separation science, for example to mention during teaching duties. On the whole the tutorial sessions, even on topics such as kinetic plots which are not quite so much flavour of the month these days, proved to be a very good draw. In the actual oral presentation sessions featuring multidimensional techniques, Kristian Horvath commented on the robustness, in his hands, of 2D-LC and remarked that it was a technique becoming mature. This was reflected in the other lectures which, apart from some mention of issues relating to sampling the first dimension, dealt mainly with applications around proteomics and environmental samples.

Interest in the HILIC mode of LC was still evident, perhaps not through number of presentations but definitely through the large numbers crowded into the room to hear David McCalley address the state-of-the-art of the subject. Even those taking a jaundiced view that HILIC has in reality been around for ages and that it was always evident that very often it would not be partition but the ion-exchange very similar to that practised by the likes of Law (on silica and –SCX phases way back in the early to mid-90s), could not fail to be impressed by the depth and scientific quality of McCalley's investigations. He had, for example, carried out kinetic studies comparing bare silica with C18 bonded silica (unexpectedly finding a smaller C term for reversed-phase and using peak parking experiments to determine B terms), found similar retention for nortriptyline on bare silica and C18 bonded silica, noted repulsive effects for acids, found evidence of silanols on silica hydride surfaces and compared selectivity for a range of so-called HILIC stationary phases (with bare silica not correlating well with zwitterionic phases, diols or amides). He concluded that in HILIC method development the nature of the stationary phase was more influential than the buffer pH which in turn was more influential than the buffer concentration and then the temperature.

Michael Laemmerhofer (right) is presented with his 2014 Chromatographic Society Jubilee Medal by John Lough, ChromSoc Exec and ISC-PSC member, at the closing session of ISC2014.

Chiral separations were a topic that apparently still warranted an oral session. In opening his talk and the session, Bezhan Chankvetadze that this was an area that, while mature, showed no signs of stagnation. However, while that may be the case and the field continues to develop through small incremental improvements, it was not entirely evident from the session that things were progressing significantly. In his own talk, Chankvetadze showed some very unusual switches in retention order of enantiomers that took place on derivatised polysaccharide chiral stationary phases (CSP) when changing mobile phase modifier or temperature, the latter being more predictable. He also stressed the value of having good chemoselectivity as well as enantioselectivity and talked of the use of core-shell CSP rather than monolithic CSP (unimpressive plate numbers). The highlight of the session was a whirlwind, virtuoso presentation by young Japanese speaker, Kenji Hamase, on 'Chiral amino acid metabolomics using two-dimensional HPLC for novel biomarker screening'. The work very much sounded impressive with the use of chiral LC in 2D-LC and the use of a derivatising agent with a 'new Pirkle column' that gave rise to chiral separations for all chiral natural amino acids but even here it was not much of an advance on what Wainer's group would routinely use for chiral drug bioanalysis in the early 1990's and also the application area (using d-amino acids as biomarkers) did come over as being a little contrived.

After Salzburg, the ISC series baton passes on to Cork in Ireland. They have a hard act to follow but Co-Chairs Apryll Stalcup and Jeremy Glennon (2nd and 3rd from left) were already hard at work in the foyer drumming up interest for ISC 2016.

All the other main areas of separation science were well covered by the plenary or keynote lectures (e.g. Felinger on fundamentals, Veuthey on UPC^2 and UPC^2-MS in the pharmaceutical industry) and in the poster presentations in particular there was impressive diversity. The posters were also very much geared to the younger generation who were pitted against one another in a poster competition organised by Gerard Rozing and served by a host of experienced judges. An innovation to the poster competition was the introduction of a concluding 'poster blitz oral session' in which 16 short-listed young scientists gave ~ 5 min talks on the subject of their poster in order to narrow things down to 8 Shimadzu poster award winners. The standard of the science was very high. The first young speaker from Japan was very unfortunate to bear the brunt of audio-visual system glitches but other than that the standard of presenting was also very high. Particularly interesting was a talk on the use of Karl Fischer titration to measure the water content of the mobile phase in aqueous normal phase LC to use a breakthrough plot to assess the degree of water adsorption on stationary phases. In this way it was assessed that Zic-HILIC had the equivalent of 6 monomolecular water layers and might operate via a partition mechanism while silica hydride had half a layer and might therefore work by adsorption. Also of interest at a separation science conference was a talk on cell-membrane affinity chromatography from an LC standpoint, this technique rarely seeing the light of day outside of pharmaceutical and biomedical meetings. It was very noticeable that most of the young speakers were students of (or had collaborated with) very well-known chromatographers (e.g. Haddad, Jandera, Wainer, Buchberger, Lämmerhofer, Hüber, Karst). However it would be highly uncharitable to implicate incestuous judging. Instead it is reassuring to know that these groups are doing a highly commendable job in producing tomorrow's leading separation scientists.

There was much, much more. Papers arising from presentations at ISC 2014 will appear in a special virtual issue of J. Chromatogr. A.

The final word on the meeting is best left to eminent Honorary Chair, Wolfgang Lindner. When asked about what his aspirations were before the meeting and whether he felt that these aspirations had been met, he said he "would need to go away and think about that". However, he did emphasise "the importance of assembling a strong team who were all pulling together. Younger members of the team had learned by practical involvement and had now been caught by the conference-organising virus and were keen to work on meetings again in the near future".

The ISC series now moves on to Ireland, ISC 2016 in Cork, and I'm sure as I write the Irish will be assembling a strong team who will all pull together.