

State of the Nation Report

(meeting report on Chromatographic Society event taking place at The Heath, Runcorn on March 18th, 2009)

by *Bernie Monaghan* - Consulting Editor, *Chromatography Consulting International* • tel: +44 (0)1695 51973 • bm@chromatographyconsulting.com

"The principal aim of The Chromatographic Society is to foster the development of separation science in the UK. Accordingly, in the preparations for this meeting the question which kept recurring was, "Why hadn't we done this meeting before?"

Through the successful Triad meetings during our Golden Jubilee year, and indeed at many other one- or two- day symposia, we had showcased all that is very good in Separation science in the UK pharmaceutical industry. However we have never, formally reviewed the status of separation science across all the other sectors.

The seeds of the meeting were sown on a suggestion that we should discuss why Separation Science research in UK academia was in such a poor state. This led to some further thoughts: (a) Who would be attracted to a meeting with a negative premise (b) Should we really assume that things are in a poor state? (c) Shouldn't we widen the potential audience by also reviewing some other sectors?

The upshot of all these deliberations is that we now have a meeting in which we will showcase what is going on in separation science across all sectors other than in the Pharmaceutical industry but including those feeding in to the pharmaceutical industry, we will critically appraise this activity and, only then, hold the first of what might prove to be several discussions on what might be the way forward."

So read the background for the meeting which attracted over 50 attendees across the spectrum of those with an interest in the future of the Chromatographic Industry, which after all is a fairly broad church. On a slightly negative note, the central location of the meeting and the number of attendees from universities who are within 60-90 minutes commute from the venue was disappointing – but in all probability that summarised the need for the meeting in the first place.

The initial presentation was made by Steve Fletcher from the Chemistry Innovation Knowledge Network who spoke on the help that is available to academics that are looking for funding and what they have to do in order to bring something of interest to the table to attract funding. The role of the network is to 'To stimulate & support product and process innovation that will deliver significant GDP growth for the UK and ensure sustainability for the chemistry-using industries, through a coherent national strategy and action plan.'

A league table of where separations lies in the list of scientific techniques for which funding is provided by EPSRC shows separations languishing mid-table (Fig 1). Steve alluded to a fundamental difficulty in obtaining funding for analytical research in that analysis may be perceived primarily as having a service function. However he also helpfully suggested that the need for chemistry to re-think its skills by combining with other disciplines through 'challenge driven' as opposed to 'curiosity driven' research projects is paramount. The conclusions from the presentation were that there were some pockets of excellent science and technology within UK universities but greater critical mass in some areas would realise benefits. The changes in

the industrial landscape with more outsourcing and pressure on costs mean that analytical R+D may not happen yet conversely there is increasingly more emphasis on the use of public funds for industrial and societal problems may generate opportunities for developing new and better measurement technologies. The trend was set for the rest of the day as the talk was followed by a spontaneous discussion session with absolutely no need for questions to be teased out of the audience.

Tony Taylor from Crawford Scientific then spoke about training needs and the UK skills base. His talk was backed up with data from a variety of sources reiterating the point that firstly we need more Chemistry graduates (the number of first

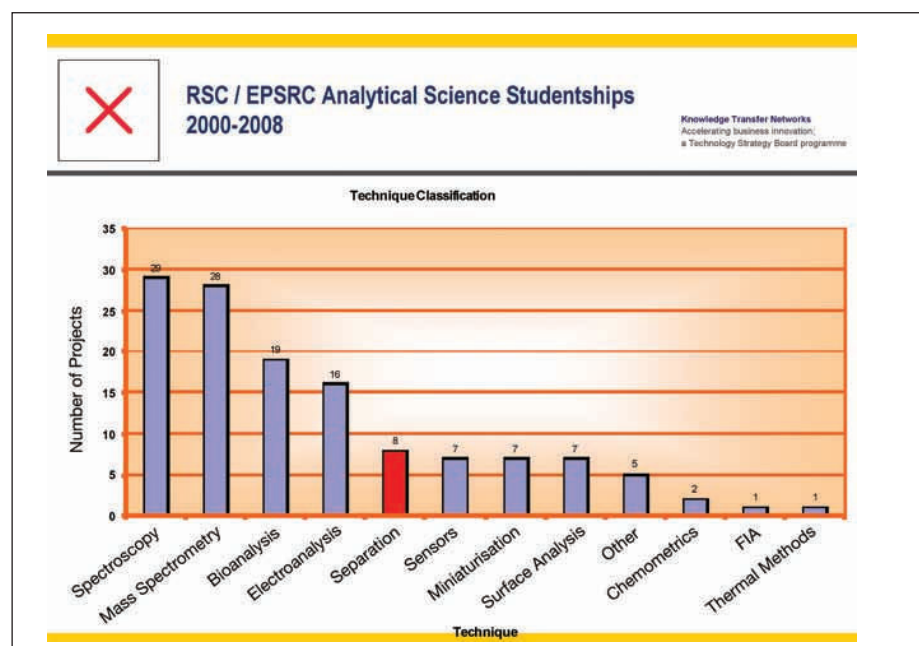


Figure 1



Figure 2



Figure 3

degree students has fallen by 20% over the last 6 years) and secondly encourage them to take an interest in Separation Science. A frightening statistic is that 90% of 'A' level students for Chemistry fail to progress that topic to first degree status. A higher level of encouragement for students and teachers showing Chemistry as a worthwhile and exciting career path needs putting in place to redress the situation. Interestingly, Tony recounted how he himself was inspired by a bepony-tailed Visiting Professor. The very same Peter Myers was in the audience, sadly now without the ponytail! This did raise the point that while it was definitely worthwhile to identify inspiring enthusiasts to go into schools and universities to promote chemistry / analysis / separation science, such individuals could not easily be found and perhaps might raise false hopes as the study of chemistry can be hard graft and learning the fundamentals can't always be made exciting. All was not doom and gloom however as Professor Brett Paull, the Head of School of Chemical Sciences from Dublin City University

realise the importance to Separation Science and these are listed in fig 2

The formation of the ISSC resulted in three clear advantages to sustain its existence for the future since it addressed the needs of all involved parties and is a blue print as to what can be achieved. 6 Million € of funding over a 5 year time frame has been solicited

- Assembling a multi-disciplinary team comprising analytical chemists, engineers and biotechnologists/bio-analysts.
- Soliciting substantial and multi-faceted support from both separations companies (technology providers) and pharma/bio-pharm industries (technology users).
- Gaining support from large network of international collaborators (leading separations groups in USA, Europe and Australia).

The various disciplines with respect to modes of separation and likely markets are shown in Figure 3. Key initiatives to the award of funding from the Irish government were that the activities involved

spoke about how the formation of a cluster (critical mass) of university departments (Irish Separations Science Cluster - ISSC) with specific skills in analytical sciences resulted in funding where it previously had proved difficult to raise. The aim of the group is to provide a multi-institutional, multi-disciplinary research cluster to provide industry with analytical solutions to complex problems. The Irish Government had identified Life Sciences and Biotechnology as one of the three areas which they were willing to fund. Ireland has the second highest % of Scientists and Engineers within the EEC (UK was not even in the top 6) which obviously aids this initiative. Certain actions have to be undertaken on this road map to

real 'industrial' engagement demonstrating societal and industrial relevance alongside the industrial support obtained – 16 companies contributing the equivalent of 1.6 Million €

The theme of one of the talks, by John Lough, that followed in the afternoon session echoed the point made earlier by Steve Fletcher relating to the balance between analytical research and analysis as a service. In departments such as Pharmacy Schools, the analyst is very much in demand for the provision of supporting technology for other projects and therefore it is difficult to focus on mainstream analytical research. Having said this, one of the secrets of the successful Irish fund-raising for separation science research that had been presented in the morning had been to highlight the importance of separation science as a supporting technology for an area that was attracting significant funding.

Two very well known and internationally respected faces from UK academia, and coincidentally both recent recipients of the Chromatographic Society Silver Jubilee medal, presented their current status with regards to obtaining funding for ongoing research with widely differing stories to relate. Dr David McCalley from the University of the West of England in Bristol had some interesting experiences trying to obtain government backing even though he has an international reputation for the quality of his published research. Even with this reputation he loses out to the older, better known Universities when it comes to grant applications. Independent assessment of the quality of the proposed research has little effect and he posed the question as to whether the people who made the awards took the easy route and decision or there was some agenda against the 'newer' universities. Fortunately Dr McCalley's reputation within the Chromatography Industry has resulted in grants being awarded by pharmaceutical companies and instrument manufacturers allowing his research to flourish.

Professor Peter Myers on the other hand offered profuse thanks to Thermo Fisher Scientific for their support and assistance in helping him put together a multi-discipline team of postgraduate and pos-doc students whose aim is to reduce the industrial habit of collecting samples in bottles and delivery to laboratories for subsequent analysis. The concept of self contained analysers would allow measurement at the point of use thereby eliminating excess labour, transport and potential for contamination. Microfabrication is seen as the answer to this problem and multi disciplinary teams involving a variety of members from differing disciplines is key to this success. Almost a mini-Cluster of its own, merely lacking the ingredient of critical mass that the ISSC currently has.

With the assistance of Ted Adlard the sorry tale was told of the decline of active groups of academic researchers in the UK over the past 20 years with the above named schools plus those led by Norman Smith at King's College, London and Jeremy Nicholson at Imperial College London and

Roger Smith at Loughborough being considered as sizeable active groups compared to around 15 groups just 10 years ago. The call for more activity and funding from the chromatography community was never more needed.

Finally the current situation regarding research in China compared to that in the UK was outlined by Dr Bo Zhang currently resident as a Research Associate at the Chemical Biology Centre at Imperial College London. In certain aspects there are advantages in conducting research in China, (cost, manpower) in other aspects the UK has the upper hand (equipment ideas, history).

Collaborations where the advantages of both countries could be utilised to produce win-win situations were suggested as a way forward..

China has its own National Chromatographic Centre at Dalian based at the Chinese Academy of Sciences which acts as a focal point for research within China. Dr Zhang is currently working on callC which is basically a capillary version of TLC.

Conclusions

The meeting certainly met its objectives and crystallised this issues which became more overt during the day viz.

- The need to raise the level of funding from Government sources should not just be viewed as shouting louder for 'more' with the begging bowl. We have to demonstrate that the current money being allocated in being put to use in producing exciting, relevant, new, innovative and of use to advancing the role of separations science to industry and social topics.
- In particular the lack of funding to what were termed 'new universities' is becoming a worry since these are just as worthy of investment as the traditional old school seats of learning. The number of active research groups within academia is shrinking alarmingly.
- More interaction with industrial sponsors who have been shown with their funding at Peter Myers group at Liverpool (ThermoFisher) and Norman Smith's group at Imperial College London (Waters) to be willing partners.
- A database of where Separation Science within Universities is actively being utilised could form the nucleus of the future critical mass of excellence or Clusters that are necessary to attract the funding in the future.

Summary

The meeting wound up with a very honest, open and frank discussion, with much valued contribution by the remaining audience, of the problems identified during the day and how proposed solutions could be adopted to raise the image of Separation Science as an interesting, 'sexy' subject which scientists of many disciplines could utilise, not just analytical chemists.

Most issues put onto the table during the discussion revolved around three main areas, one

being the image of Separation Science in general, the second the role that the Chrom Soc needs to adopt in order to appeal more and attract the new blood that any organisation needs to survive and thirdly how to generate more support either from Government funding, from the commercial companies who have a vested interest in ensuring the industry continues to thrive or the people who rely on innovation at the grass roots level to help their products become commercial success such as the pharmaceutical industry on the LC side and petrochemical and chemical industries on the GC side.

Separation Science is a technique that in itself may not be enough to get mainstream media attention but its application in solving problems which have received media attention recently such as the Melamine contamination issues, plastics in baby feed bottles and last year contaminants in Sudan Red food additives mean that there is no shortage of material that could be turned into a positive for Separations Science.

With the London Olympics coming up there will be renewed emphasis on the role of Drug Testing, which will certainly throw up more opportunities for stories. This lack of profile within the scientific community could be a contributing cause in the reduced funding that Separation Science receives from the research 'pot'. The importance of the technique with regards to its place in helping to develop every pharmaceutical on the market alone should get the technique a higher rung up the funding ladder. The apparent lack of a scientist of international repute currently engaged in Separations Science Research in the UK to act as a figurehead (J.H Knox being the most recent one that springs to mind) does not help the matter. Brett Paull had talked about the Irish Separation Science Cluster, the formation of which had led to funding from external sources, and he recommended that serious consideration should be given to a similar organisation within the UK. No easy task given the relatively small number of active research centres within UK universities. What could clarify the picture somewhat is a central database of all universities currently active in this area since its not beyond the bounds of possibility that work is ongoing which may be academic in nature but still worthy of a wider audience. All instrument companies have databases of Universities to whom they sell so this could be a source of where activity is ongoing, maybe collated by the Chrom Soc. After all, with suitable safeguards to protect companies' commercial information, it is in everyone's interest to become involved in the Separations Science field to pool information for the communal good surely?

As regards the Society's role in this activity then certain actions were identified that the Society should seriously consider implementing to position itself as a broader chromatographic

church which will help it appeal to a wider audience than currently.

The Society may need to revisit and reword its constitution but the consensus from the attendees was that it needs to develop a higher profile amongst younger scientists in particular by making them aware of a) its very existence, b) what it does and c) why chromatography and its application can be interesting.

A strategy for increasing membership numbers is needed. Ideas for consideration as means of communicating with 'tomorrow's' separation scientists include utilising 'on line' methods of communication. The formation of a Facebook (and similar social networking sites) group dedicated to Separations Science topics and meetings, Blogs, videos posted on YouTube (already used by many instrument companies to drum up interest in their products) and downloadable Pods of meetings were discussed. Other possibilities talked about were forming closer ties to other separation science groups worldwide with web links maybe allowing viewing of presentations made at meetings anywhere in the world. Comment was passed that the Chrom Soc web site must be sharper and more up to date than it currently is on a regular basis.

Further topics which were voiced but time prevented further elaboration was the possibilities of forming sub-groups of special interest, Pharmaceutical, GC, Automation etc and also the need to gather more feedback from members and prospective members as to what they wanted from the Society and issues they felt are of interest, or not, for future meetings. This could be facilitated by on-line polls or the use of external agencies that could organise more in depth discussions with people. Perhaps the time had come for a more pro-active Publicity Officer in some kind of full or part-time roll.

Whichever options are eventually implemented from the meeting the fact remains that something different needs to be done in the way of outwards facing activities to get attention and interest in the topic of Chromatography. Commerce wise it is viewed as a mature market but it has reached a plateau which is not expected to drop lower and with the right profile can be a major player in the scientific world with its myriad of emerging techniques which are viewed as 'sexier' than Chromatography but do not have the longevity of Separation Science.

How many scientific disciplines have rated a mention in the TV series The Simpsons (1) where a Gas Chromatograph featured in one episode in the past? Separation Science can be viewed as trendy/sexy and interesting after all.

References

1. 'Flaming Moe's' Episode 12, Series 3, The Simpsons®, Fox TV.