focus on
Mass Spectrometry & Spectroscopy

BMSS Reverts Back to Industry Location for Annual Meeting

Bernie Monaghan, Consulting Editor, International Labmate Ltd, bernie@intlabmate.com

Figure 1. Exterior of AstraZeneca Conference Centre

As more and more Scientific meetings and Exhibitions have to look at their finances to justify if, where and how often they are going to hold their event even some of those that have been on the Scientific Calendar for over a quarter of a century are not exempt from this exercise. Pressure on peoples time and in the case of trade shows, decreasing customer Budgets (so why bother going?) are further issues to be considered. The BMSS annual meeting, even though this was the 33rd holding was no exception to the current climate for careful planning and fortunately with a little 'non standard' time keeping has hopefully ridden the current wave.

In her letter to the delegates the BMSS Chair explained the rationale that the Organisation has had to adopt moving forwards since there is certainly still a need for this kind of meeting to serve the MS community. "Due to the International MS Conference in Japan in September we have moved to an Easter date for this year so it comes close on the heels of the 32nd Meeting.

We don't usually arrange an Annual Meeting in the year of the IMSC, but as the frequency of these has increased to every two years we have no choice. The BMSS cannot continue in its current form if it only has income from an Annual Meeting every other year. So rather than scale down our funding of activities we will be trial running a meeting every year – a truly annual meeting."

She went on to elucidate further "BMSS used to hold a smaller meeting at Easter in the past so the date is not completely new to us. However, as organisationally it is so close to the Cardiff event last September, it has given us an opportunity to make some changes in the format.

There are so many meetings these days that we want to identify what format will ensure future BMSS Annual Meetings continue to be as successful as ever. Having broken away from the University environs in 2010 we have chosen to stick with that decision and come north to the AstraZeneca Conference Centre. Firstly it because it balances out our two years in South Wales somewhat, but more importantly the venue suits the shorter format meeting.

The 33rd Annual Meeting sees us return to a two day event and runs with just one oral session at a time. Our aim is to continue bringing together a wide range of MS practitioners so the four sessions are open, rather than focussed on specific topics, to enable us to celebrate the incredibly wide frontiers at which our technique operates."

Format of meeting

As the meeting had reverted to a two day format so the presentations had to be restructured. In this case running with just one oral session at a time (as opposed to parallel sessions). The aim was to continue bringing together a wide range of MS practitioners so four open sessions were run which allowed, rather than focussed on specific topics, the meeting to celebrate the incredibly wide frontiers at which the technique operates.

As we have the exciting prospect of hosting the 2012 Olympics in the UK this Summer the meeting opened with a Plenary presentation by Professor David Cowan (The Drug Control Centre, King's College London) who has led the organisation of the complex drug-testing labs set up for the Games.

Lowering The Limits - Catching The Sports Drug Cheat

Preparations are nearly complete to accredit the Anti-Doping Science Centre in Harlow to analyse more than 5,000 urine and 1,000 blood samples from athletes competing in the 2012 Olympic and Paralympic Games.

Several new chromatography coupled mass spectrometric methods have been developed to provide "super fast, super sensitive" analysis. The new methods range from using isotope ratio mass spectrometry (C-IRMS) for measuring $^{12}CO_2$ and $^{13}CO_2$ to evidence testosterone administration to the analysis of peptides for the presence of synthetic insulin and quantification of IGF-I to help prove growth hormone administration. The C-IRMS method incorporates a solvent-free injection system, GC-GC with heart-cutting followed by sample splitting to a scan MS and the IRMS. Our UPLC®-MS instruments include a bespoke bar-coding system (now a standard

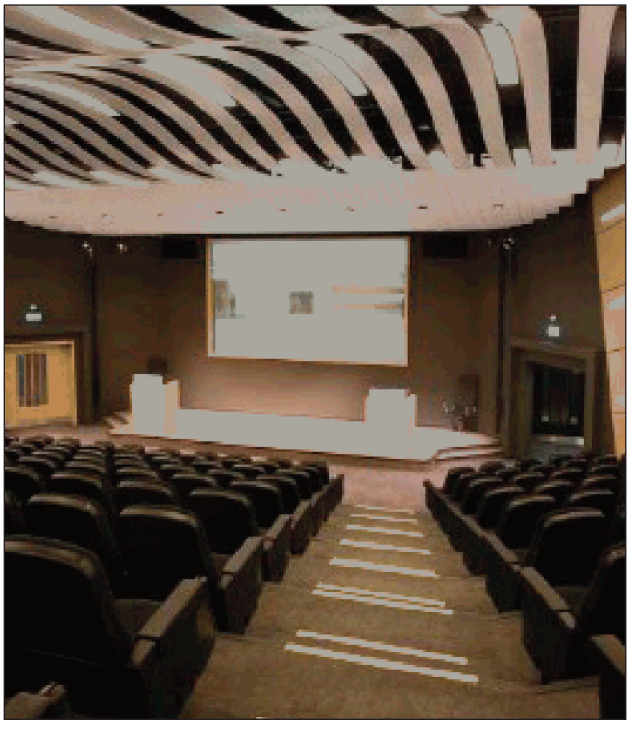

Figure 2. Main lecture theatre

option) and, for the first time at an Olympics, we will screen samples using UPLC® with high-resolution mass spectrometry for total data capture. This will enable us to target or to look at the data retrospectively for any suspicion of designer drug use.

Our aim is to deter drug misuse in sport and this presentation will illustrate how bioanalytical science with mass spectrometry can help.

The session then provided a platform for others to talk about the ever lower limits of detection that MS is pushed towards and the challenges that face them.

Using LCMS and pyGCMS to identify pigments in micro samples from works of art - *Perry et al. (Northumbria University)*

Determination of a Urinary Drug Metabolite using LC-FAIMS-MS and LC-FAIMS-In-source CID-MS - *Smith et al (University of Loughborough)*

Deamidation of collagen peptides in ancient bones using FT-ICR-MS - *Hurtado et al (University of Warwick)*

Clinical Testing of Rapid Evaporative Ionization Mass Spectrometry-based Intraoperative Tissue Identification - *Sasi-Szabó et al (University of Debrecen, Hungary)*

Enhancing the detection limits of direct-real time MS in breath analysis - *Iain White (University of Leicester*

After lunch Dr Andy Pitt (Aston University) gave the second Plenary Lecture describing how he now produces more data more quickly.

Speeding Things Up

'Bigger, faster …. better? The application of rapid scanning ToF MS' was the title of his talk

QqToF mass spectrometry instruments continue to develop rapidly in both sensitivity and speed, to the extent that ToF-based MRM scanning is becoming feasible. This has applications across proteomics and metabolomics, but requires that the data quality is sufficient and the software keeps pace. Dr Pitt presented data generated using this new instrumentation and discussed whether this offered improvements.

This was then followed by a number of examples of how MS is used to generate complex data-sets that were unthinkable just a few years ago, or where time is saved by analysing samples with almost no clean-up beforehand.

The use of an on-line two-dimensional (RP/RP) liquid chromatography mobility enabled approach for the characterisation of the cellular proteomes - *Scrivens et al (University of Warwick)*

LC-MS/MS Analysis of Eicosanoids and Isoprostanes: Understanding The Role of Nanoparticles in Generating Infl ammation and Oxidative Stress - *Maskrey, et al Lipodomics Research Facility*

Monitoring the effects of physiological stress by metabolic profiling of saliva using ultra performance liquid chromatography-ion mobility-mass spectrometry - *Malkar et al (University of Loughborough)*

Surface analysis using micro-PADI Mass Spectrometry in ambient conditions - *Bowfield et al. (University of Liverpool).*

Developing automated dried blood spot direct analysis techniques for high sample throughput quantitative bioanalysis - *Paul Abu-Rabie, GlaxoSmithKline*

As an opening to the second day the meeting welcomed Will Brinckerhoff (NASA Goddard Space Flight Centre) with a Plenary about the use of MS in the extremes of space research.

Taking Ms To The Extreme

'Mass Spectrometers in Space!'

Exploration of our solar system over several decades has benefitted greatly from the sensitive chemical analyses offered by space flight mass spectrometers. When dealing with an unknown environment, the broadband detection capabilities of mass analysers have proven extremely valuable in determining the composition and thereby the basic nature of space environments, including the outer reaches of Earth's atmosphere, interplanetary space, the Moon, and the planets and their satellites. Numerous mass analyser types, including quadrupole, monopole, sector, ion trap, and time-of-flight have been incorporated in flight instruments and delivered robotically to a variety of planetary environments. All such instruments went through a rigorous process of application-specific development, often including significant miniaturisation, testing, and qualification for the space environment. Upcoming missions to Mars and opportunities for missions to Venus, Europa, Saturn, Titan, asteroids, and comets provide new challenges for flight mass spectrometers that push to state of the art in fundamental analytical technique. The Sample Analysis at Mars (SAM) investigation on the recently-launch Mars Science Laboratory (MSL) rover mission incorporates a quadrupole analyser to support direct evolved gas as well as gas chromatograph-based analysis of martian rocks and atmosphere, seeking signs of a past or present habitable environment. A next-generation linear ion trap mass spectrometer, using both electron impact and laser ionisation, is being incorporated into the Mars Organic Molecule Analyzer (MOMA) instrument, which will be fl own to Mars in 2018. These and other mass spectrometers and mission concepts at various stages of development were described

This talk was followed by a range of examples of MS operating at the extremes.

LCMS to support drug discovery and early phase clinical trials in the Division of Cancer Therapeutics at The Institute of Cancer Research - *Florence I Raynaud*

The use of GC-MS and LC-MS to support manufacturing of pharmaceutical products - *Alice Laures, GlaxoSmithKline*

Exploring structural differences between two similar fibril morphologies of beta-2 microglobulin - *Woods, et al (University of Leeds)*

Improved data acquisition and data handling methods for MALDI-MS and MALDI-MSI of small molecules in tissue - *Josephine Bunch, Rian Griffiths, Andrew Palmer, Alan Race, Rory Steven, Joscelyn Sarsby and Sarah Turker*

Binding site identification of glyoxal in Substance P by mass spectrometry - *Andrea F. Lopez-Clavijo et al (University of Warwick).*

Finally Professor Juri Rappsilber (University of Edinburgh) spoke about the incredible macromolecules now amenable to MS, leading us into a session highlighting the great and the small of applications of MS.

Pioneering Ms Great And Small

'Structural biology by mass spectrometry: 3D proteomics of supramolecular Assemblies' was Professor Rappsilbers talk.

Current structural biology methods leave an information gap in the mid-resolution range at which protein interactions or conformation changes are defined at domain or sub-domain level. Mass spectrometry in conjunction with cross-linking is providing exactly this information. Professor Rappsilber applied tools to complexes up to 670 kDa in size, endogenous, tagged complexes and even whole cell lysates. He furthermore analysed conformation changes in solution using stable isotope labelling for quantitative analyses. This approach transformed cross-linking/mass spectrometry from an expert approach to routine application by establishing an integrated workflow through having: (1) developed an enrichment strategy for cross-linked peptides based on charge; (2) characterised in detail the fragmentation behaviour of cross-linked peptides in a high resolution mass spectrometer; (3) derived lessons from this for a search algorithm that does not require isotope-labelled cross-linkers and overcomes the n2 problem of database searching for cross-links; and (4) written user friendly web-based search software that includes a revolutionary spectrum viewer for match evaluation with implications reaching beyond this field and a cross-link map viewer for fast hypothesis generation that expands the current visualisation concepts of protein network viewers such as used in string.

He postulated that cross-linking/mass spectrometry is now ready for deployment into structural and molecular biology laboratories for routine application.

The other talks in this session were;

The advantages of absorption mode spectra - *O'Connor et al (University of Warwick)*

Self reporting oligonucleotide probes – a new design for small mass tags - *Riley et al (University of Southampton)*

The metamorphic protein lymphotactin undressed by IM-MS and top down ECD - *Harvey et al (University of Edinburgh)*

Application of nanoUPLC®-MS/MS to quantify human insulin-like growth factor I prohibited in sport - *Lopes et al, (Kings College London)*

Finding small needles in a hay stack: how large-scale proteomics helps to identify key players in powdery mildew infection of barley - *Bindschedler et al (University of Reading)*

Unlike at recent meetings a dedicated Young Generation session was not held on this occasion but opportunities were given to young researchers throughout the open and poster sessions

Exhibition

The Exhibition at this meeting was less elaborate than normal but is still the UK's focal point for anyone who wants to approach the breadth of companies involved, in one way or another, with MS. In response to feedback at Cardiff the organisers wanted to increase the opportunities for technical interactions and discussions so mixed the posters and the Exhibitors to stimulate this. It meant that at coffee breaks and lunchtimes all the delegates could stay together in the one place.

The following companies exhibited at the meeting;

AB Sciex
Advanced Chemistry Development Inc
Agilent Technologies Ltd (Meeting Sponsor)
Bruker UK Ltd
Crawford Scientific Ltd
Expedeon Ltd
Fortis Technologies Ltd
Hichrom Ltd
In House Gas Ltd
Jaytee Biosciences Ltd
KR Analytical Ltd
KRSS Ltd
LECO Instruments (UK) Ltd
Microsaic Systems
Peak Scientific Instruments
Perkin Elmer
Presearch Ltd
ProteaBio Europe
Providion
SIAL Ltd
Shimadzu
Spectral Works Ltd
Thermo Fisher Scientific (Meeting Sponsor)
VRS
Waters Corporation (Meeting Sponsor)

As ever the organisers asked for feedback on the format or any other aspect of the meeting which can take the meeting forwards and ensure it will meet the needs of the membership.

Date and venue for next meeting

Continuing with the non-University venue theme but reverting back to the September time frame the 34th Meeting will be held from the 9-11th September 2013 at the Eastbourne Winter Gardens.

Finally the score sheet

170 Delegates, 25 Exhibitors, 70 Posters, 4 Plenary lectures, 20 Oral presentations and an incalculable number of cups of tea/coffee/glasses of vino.