

Organic Division: Carbohydrate Group Newsletter, August 2012

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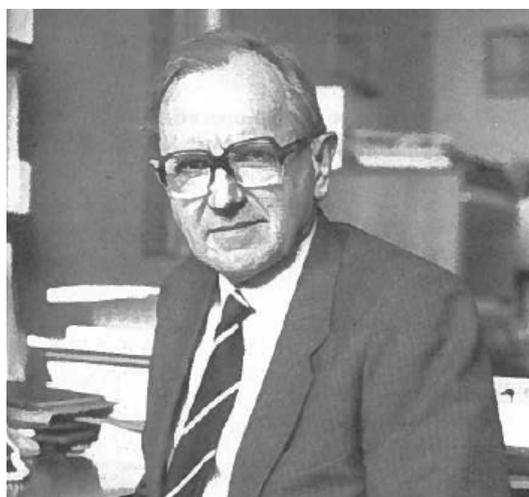
Haworth Memorial Prize Lectureship 2012

Professor David Bundle FRSC from the University of Alberta has been chosen to give the 2012 Haworth Memorial Prize Lecture. Professor Bundle is an internationally recognized leader in the area of carbohydrate chemistry and glycobiology. His contributions to these fields span a broad range of topics from synthesis to molecular recognition and from conjugate vaccines to multivalent therapeutics. His pioneering contributions include NMR methods for polysaccharide structural analysis, the synthesis of conjugate vaccines, the conformational analysis and computer assisted molecular modelling to determine free and bound oligosaccharide conformations, the structural and thermodynamic basis for molecular recognition of oligosaccharides by antibodies and most recently, unique approaches for the design of multivalent ligands that address the problem of the notoriously weak binding of sugars by their protein receptors.

Professor Bundle will deliver his lecture during the Carbohydrate Group Autumn meeting which will take place at the University of Birmingham in September this year (see below for further details). The location is particularly fitting as Sir Norman Haworth, after whom the award is named, held the Mason Chair of Chemistry at the University of Birmingham from 1925 until his retirement in 1948.

Professor J. Grant Buchanan

It is with sadness that we note that Professor Grant Buchanan died on 17 April 2012 at the age of 85. Born in Dumbarton in 1926, Grant Buchanan was a pupil at Glasgow Academy before moving to the University of Cambridge in 1944 to undertake his undergraduate studies and then PhD with Lord Todd on the structure of vitamin B12. Postdoctoral appointments took him to UC Berkeley to work with Melvin Calvin and then to James Baddiley's lab at the Lister Institute in London. He was appointed to a lectureship at the University of Newcastle where he made important contributions to the study of bacterial polysaccharides and sugar epoxides. After rising through the ranks in Newcastle to become Reader in 1965, he moved back to his native Scotland in 1969 to become the first Chair of Organic Chemistry at Heriot-Watt University in Edinburgh, where he remained until his retirement in 1991. However, his scientific work continued as a Visiting Professorial Fellow at the University of Bath where he taught undergraduates and supervised research projects. He was also editor of Carbohydrate Research, the UK representative on the International Carbohydrate Organisation and served as President of the European Carbohydrate Organisation. He will be remembered fondly for his many contributions to the UK and international carbohydrate communities.



Recent Conferences

A workshop co-sponsored by the Biochemical Society and the RSC Chemical Biology Interface Division took place in London on Wednesday 21st March. The meeting at Charles Darwin House was hosted by Professor Rob Field, Professor Jane Thomas-Oates and Dr Stuart Haslam. The discussion meeting on "Carbohydrate analysis and glycomics: where next?" addressed a broad range of topics that should be the focus for future developments in the field. A summary of the discussion points is appended to this newsletter.

Dextra Carbohydrate Award 2013

This award, which is sponsored by Dextra Laboratories, was founded in 1970. It is usually presented to a scientist within 15 years of receiving their PhD for meritorious work in carbohydrate chemistry that has largely been conducted in the UK. The award lecture, which is generally delivered at the Group's Autumn meeting, may deal with any area of carbohydrate chemistry including analytical, biological, organic, physical or technological aspects. Nominations for this award can be made until the end of January 2013.

In order to make a nomination for this award you will need to supply:

- Your name and contact details
- The candidate's name and contact details
- A supporting statement of **no longer than one A4 side** of 11 pt text
- A **one page** CV for the candidate which should include their date of birth, website URL, summary of education and career, a list of five relevant publications and total numbers of publications and patents. A template CV is available on the RSC website: http://www.rsc.org/images/template_curriculum_vitae_tcm18-206520.pdf
- Information should be sent to the Carbohydrate Group secretary by January 15 2013.

Next RSC Carbohydrate Group Committee Meeting

The next Group committee meeting will be held in during the Autumn meeting in Birmingham. If you have items that you would like to bring to the attention of the committee, please contact either Rob Field or Bruce Turnbull.

Committee Membership

Committee members typically serve a 2 year term and we are therefore regularly looking for new members, from across the full range of glycoscience, academic and industrial. Individuals who would like to get involved in shaping the future of the group, its' interaction with other RSC groups and with the wider scientific community are welcome to contact either Rob Field or Bruce Turnbull.

Next RSC Carbohydrate Group AGM

The next Group AGM will be held in during the Autumn meeting in Birmingham. If you have items for the Agenda, please contact either Rob Field or Bruce Turnbull.

Future Conferences

RSC Carbohydrate Group Autumn Meeting

A joint meeting of the RSC Carbohydrate Group and COST Action CM1102 Multivalent Glycosystems for Nanoscience

Thursday 27-Friday 28 September 2012, University of Birmingham

Organisers: Dr John Fossey and Dr Bruce Turnbull

For more information contact Dr John Fossey (j.s.fossey@bham.ac.uk)

European and other International meetings

- European Young Investigators Workshop: deciphering the Glycome – from synthesis to application and 7th Glycan Forum Berlin (Berlin, Germany) 24-29 March 2013
- Carbohydrate Bioengineering (Prague, Czech Republic) 21-23 April 2013
- Carbohydrates Gordon Conference (West Dover, VT) 16-21 June 2013
- International Symposium on Glycoconjugates (Dalian, China) 23-28 June 2013
- Eurocarb (Tel Aviv, Israel) 7-11 July 2013
- XIIIth Cell Wall Meeting, (Nantes, France) 07-12 July 2013
- International Carbohydrate Symposium (Bangalore), 12-17 January 2014



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ANALYTICAL TOOLS FOR LIFE SCIENCES

Biochemical Society
Advancing Molecular Bioscience

Summary of queries and discussion points raised during the Biochemical Society / Royal Society of Chemistry Workshop *Carbohydrate analysis and glycomics: Where next?*

London, 21 March 2012

Organizers: Rob Field, Jane Thomas-Oates, Stuart Haslam

MAIN POINTS

- [1] Need to stop beating ourselves up! Glycoscience is complex, but we are making major advances; impact will come, but a positive spin for non-glyco audiences is important.
- [2] Do we need to identify major biological problems/grand challenges to acquire funding as a collective? Focus around infectious diseases, Parkinson's/Alzheimer's, stem cells, bioenergy, food? (others?) Need to identify focal points around which to lobby the funding agencies?
- [3] Need greater coordination of know-how, infrastructure and training. Support for networking (electronic?) driven by the younger members of the community.
- [4] Need to ensure that glycoscience is taught early on in degree programmes so that *all* bioscience and chemistry students have at least have some awareness of the topic
- [5] Consideration of how glycoscience could contribute to/benefit from synthetic and systems biology would be timely.

ORGANISATION AND FACILITIES

- . Increased access to glycomic technologies/instrumentation
- . A methods database for better information exchange
- . Would a regular forum/meeting (perhaps methods-oriented) be useful?
- . Networking – e.g. via research maps based on keywords
- . A high visibility directory/website of UK glycoscience expertise/instrumentation
- . Centres of excellence for key technologies or distribution (fragmentation) into diverse laboratory settings?
- . Reagent/enzyme suppliers – who is best?
- . Standardisation of data for submission to public repositories (http://glycomics.cccr.uga.edu/MIRAGE/index.php/Main_Page)
- . The RSC and the Biochemical Society are willing to support the development of greater coordination in UK and EU glycoscience education and research
- . The Society for Glycobiology serves as the only membership-based international representative organization specifically for the glycosciences: www.glycobiology.org
- . The European Glycosciences forum (<http://www.egsf.org/>) will be hosting an international workshop in Madrid in July to review the coordination on international glycoscience. The forum also has funds available to sponsor EU-wide networking or training events
- . Call for input: the US National Academy of Sciences/National Research Council is conducting a study entitled "Assessing the Importance and Impact of Glycomics and Glycosciences." <http://glyco.nas.edu/feedback>
- . NIH funding to researchers at the CCRC in Athens, Georgia aims to provide access to all human glycosyltransferases in the near future

WISH LIST/CHALLENGES/QUERIES

- . A broad specificity 'O-glycanase'
- . Organic synthesis of various glycans to be used as acceptors for different assays
- . Rapid characterization methods for glycans (e.g. biosecurity, diagnostics, field-use sensors)

- . More specific assays
- . Methods to demonstrate that GM active ingredient proteins are not glycosylated
- . Methods to demonstrate that glycoproteins are/are not allergens
- . What is the gold standard technique for global N-glycan analysis? Is ms the only answer or are chromatography techniques OK?
- . Do different types of analysis tell the same story?
- . As clinical diagnostic tests move closer to the patient are any techniques other than mass spec which can be to rapidly detect or determine clinically important glycans in patient samples? Could there be a role for lectin arrays and/or synthetic lectins?
- . Devices needed for field use – e.g. for biosecurity
- . Are there glycan-based biomarkers? If so, make more of the fact these are glycans?
- . What are the regulatory requirements for glycoproteins and how do we meet them?
- . Need for regulatory guidance on heterogeneity – is it important?
- . Current status of high through-put glycan sequencing?
- . How do you read out sugars in a nanopore device?
- . Where is the next generation of glycotecnologies coming from?
- . In proteomics, targeted analysis is the next big area. Where is targeted glycomics?
- . How do we determine the structures of proteoglycans in order to give more relevant structure-function information?
- . Along with protein-carbohydrate interactions, can we analyse carbohydrate-carbohydrate interactions?
- . Inter/intramolecular binding site distributions. Impact of multivalency in glycan interactions?
- . How big a challenge is the immobilization of oligo-polysaccharides via specific end groups? (e.g. for glycan arrays)
- . Glycans are often reduced to one GlcNAc for glycoprotein crystallography. Does this matter? Can we add glycan structure back to the protein backbone?
- . Best practice with regards separation, quantitation etc?
- . Quantification of glycans?
- . Quantification? Within and between samples?
- . Quantification? And of what, for non-mammalian glycoproteins?
- . Quantification of polysaccharides (e.g. different parts of pectin) in the plant (*i.e. in situ*)
- . More universal methods to characterize (and quantify) mixtures of carbohydrates
- . If a sample needs carbohydrate purification, how do we know we aren't losing structures? Need for in-line detection/quantification without radioactivity
- . Quick/cheap quantification of plant cell wall oligosaccharides
- . How to quantify (glycans/glycoproteins – with respect to regulatory requirements)
- . Glycoinformatics is lagging well behind other areas of informatics
- . Need/opportunity for a synthetic biology toolkit, e.g. for quantitation standards
- . Issue of synthetic polymers – they are not as simple as they look
- . More hydrolase enzymes needed – look in leaf litter, and other unsavoury places – phages are good sources of these
- . Phage display has potential for the *de novo* generation of glyco-recognition tools

TOWARDS BIOLOGICAL FUNCTION AND EXPLOITATION

- . What are the interaction partners of the various glycans? How are they regulated?
- . Challenge of transferring *in vitro* to *in vivo* studies – e.g. *in vivo* imaging of glycan dynamics
- . Dynamic vs static glycan analysis – possible? Impact of cell culture effects on glycosylation – is data reliable?
- . Where are we with regard to being able to study glycosylation events in whole cell systems in real time?
- . Can we now manipulate cell glycosylation and hence cell-cell communication in ageing and cancer?
- . Changes in glycome with the cell cycle?
- . Cause and effect in glycosylation patterns with disease state?
- . How can glycomics contribute to increasing assimilation in crops?
- . Food crop yields are a big challenge. How can understanding glycans/glycoproteins help drive improved yields?
- . 3D structure – functional studies leading to 'network' analysis (pattern recognition as opposed to binding a single/specific structure?)
- . Are minor changes in total sugar profiles important physiologically and how do you rank importance?
- . How do we deal with heterogeneity/polydispersity? How important is it anyway?