

Introduction

2012 was a busy, eventful and successful year for the Astbury Centre, as this letter and the scientific reports that follow portray. Thank you to all Astbury members: the principal investigators, facility managers, technicians, students and postdocs for all of your efforts into generating this success. Without your enthusiasm, hard work, collegiality and excellent science that bring different disciplines together, this could not have happened. Thank you also to those that have funded our activities, including our members, Deans and Heads of School for supporting local events, and a wealth of funding bodies that includes MRC, BBSRC, EPSRC, EU, The Wellcome Trust, Leverhulme Trust, Royal Society, other Charities and Industry, for enabling us to prosecute our science in a well-funded and well-equipped environment.

This annual report provides summaries of some of the success stories from the Astbury Centre's research activities and outputs in 2012. In its pages you will find new and exciting research stories, which span fundamental research in the area of Structural Molecular Biology in its widest context. In addition, the exploitation and development of our fundamental research findings in biotechnology, bioengineering and medicine are described. The pages and co-authors of each report demonstrate the successes made possible by the interdisciplinary research within the Centre. They also highlight the breadth of activity in the Centre that spans studies of molecular interactions within cells, to the development of new physical and chemical methods for studying biological systems.

During 2012, the Centre continued in its quest of "Understanding Life in Molecular Detail" through an array of different activities, including seminars, publications, public lectures and other events. We continued to enjoy an excellent seminar series (organised by Arwen Pearson), hosting 14 lectures during 2012 with speakers from the UK, Germany, USA, Hong Kong, and The Netherlands. The Centre's Annual Research Retreat, held at the Thackray Medical Museum in Leeds in September, also provided an excellent opportunity for members to present and discuss their data in the form of seminars and posters. A hugely successful day was experienced by the 125 members who attended this event. Finally, by holding events focusing on research facilities (taster series, hands-on experience sessions and lectures) our facility managers provided opportunities for members to experience new research techniques, whilst a new series of "Research Theme" events enabled our principal investigators to meet to plan new activities in different areas, the first events in 2012 including "Imaging and Single Molecule Techniques", "Protein Modification Technologies" and "Biomembranes".

The Centre welcomed three new academic staff members in 2012 (James Duce (Alzheimer's Research UK Senior Research Fellow), Sergei Krivov (RCUK Research Fellow) and Simon Connell (Lecturer, School of Physics and Astronomy)) that bring, respectively, expertise in Alzheimer's disease, computational biology and biophysics, and AFM methodology. We were sorry to lose Narcis Fernandez-Fuentes, Steve Johnson and Paul Ko Ferrigno from the membership in 2012, although Paul Ko Ferrigno (now working for Avacta plc) will continue to play a role in the Centre as a visiting member. We were also delighted to welcome many new PhD students and postdoctoral members to the Centre this year. This takes our current numbers to 56 academic staff, 192 PhD students and 100 postdoctoral fellows.

Astbury Centre members continued to be successful in publishing their research. In total, members published 139 manuscripts in 2012, including papers in *Angewandte Chemie Int. Ed.*, *Nature Communications* and *PNAS*. Highlights included – an understanding of the mechanism of bacterial resistance to fusidic acid (Edwards and O'Neill groups, front cover); the development of a sortase catalysed method for chemoselective N-terminal labelling of recombinant proteins (Turnbull and Webb groups); the production of biotemplated magnetic

nanoparticle arrays and quantum dots embedded in lipid nanotubules (Evans and Staniland groups) and the identification, by single molecule methods, of coat protein-mediated collapse of viral RNA during virus assembly (Stockley and Tuma groups). Astbury members also enjoyed success in raising grant income in 2012. Highlights included a large (£1.4M) Equipment Grant funded by the MRC (led by Michelle Peckham) for high resolution imaging equipment that brings new research capability to the Centre. Peter Olmsted, with colleagues in the Universities of Leeds, Imperial, Nottingham, Durham and Cambridge, were awarded a large (£4.8M) grant from the EPSRC for studies of membranes, while Adam Nelson was involved in leading a successful, large consortium bid to the EU (€196M) for a “European Lead Factory”: the world’s largest public-private partnership in health that involves 30 partners spanning universities, SMEs and Pharma which is due to commence in 2013. These, together with >£5.9M new income raised for project and programme grants, brings the Astbury portfolio to a £30M share in £50M worth of grants in 2012. These awards are testament to the success of our members and the Centre. Well done all!

2012 saw continuing success of the members of the Astbury Centre in terms of peer recognition. Our student and post-doc members again received several awards at a variety of international meetings, including best oral presentation (Scott Jackson, Peter Henderson’s laboratory) and best posters (Jo Rushworth and Aneika Leney, from Nigel Hooper’s and Alison Ashcroft and Sheena Radford’s groups, respectively). Congratulations also to those who received honours: Andy Wilson for the 12th Bob Hay lectureship prize of the Royal Society of Chemistry and Robin Bon for the Thieme Chemistry Journal Award. Others also continued to develop our outreach activities: Bruce Turnbull inspiring local audiences (including “Café Scientifique”, “The Humanist Society of West Yorkshire” and others) with his lecture entitled “Synthetic Biology – a Brave new world?”, whilst student members gave presentations at the House of Commons (Tom Lanyon-Hogg (Alison Baker and Stuart Warriner’s group); or won acclaim for their novel contribution in developing new games based on scientific research run by The Wellcome Trust (Thomas Forth (David Westhead’s group).

The Astbury Society, currently led by the presidents Sasha Derrington and Megan Hughes, along with previous presidents Heather Cox and James Towey, played a magnificent role in Astbury activities hosting social events. In 2012 these included the now famous Christmas quiz and pizza night and new activities such as a Games Night, Film Night, Scavenger Hunt and the much-enjoyed cake bakes and coffee mornings. The society also hosted the barbeque and Sports Day at the sixth Annual Astbury Lecture which this year was given by Professor Roger Goody (Max Planck Institute, Dortmund, Germany). Photos of these events can be seen at www.astbury.leeds.ac.uk/about/society.php. Do take a look!

I hope that you enjoy reading this Annual Report, whether you are a member of the Centre, a visitor, a member of our Industrial Advisory Board, a funding agency that supports our activities or a passing reader with an interest in Structural Molecular Biology and the activities of our Centre. Finally, thanks to David Brockwell for preparing this report. It is with much excitement that we look forward to continuing our successes in 2013.

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Leeds, April 2013*

Please note that this report (as well as those from previous years) is also available as a PDF document which can be downloaded from our website (www.astbury.leeds.ac.uk).