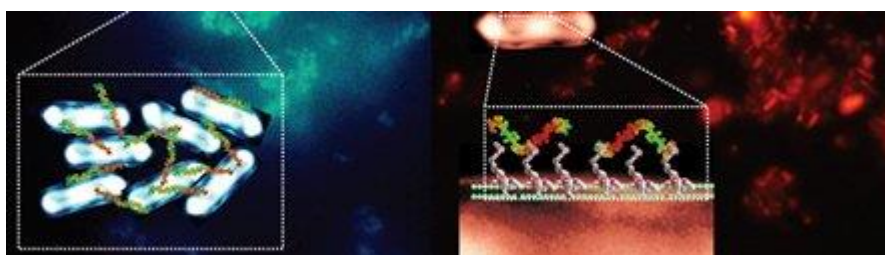




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The School of Pharmacy Journal



May-July 2014

Foreword

Welcome to our latest edition of the School of Pharmacy Journal, a quarterly collection of publications and press releases from May to July.

1. New research paper: Hijacking bacteria's natural defences to trap and reveal pathogens.

Bad bacteria could soon have no place left to hide, thanks to new materials that turn the cell's own defences against them. Scientists at The University of Nottingham and GSK Consumer Healthcare have developed a technique that could locate the potential source of an infection by hijacking the normal processes of pathogens, thus revealing their location. And by using fluorescent markers to tag these cells, they have even been able to detect them by using a simple mobile phone camera. The breakthrough, published in the journal *Nature Materials* **13**, 748–755 (2014), could offer an easier way of detecting pathogenic bacteria outside of a clinical setting and could be particularly important for the developing world, where access to more sophisticated laboratory techniques is often limited. The research was led by Professor Cameron Alexander, Head of the Division of Drug Delivery and Tissue Engineering and EPSRC Leadership Fellow in the University's School of Pharmacy, building on work by PhD student Peter Magennis. Professor Alexander said: "Essentially, we have hijacked some of the metabolic machinery which bacteria use to control their environment, and used it instead to grow polymers which bind strongly to the specific bacteria that produce them. The study was funded by a Biotechnology and Biological Sciences Research Council (BBSRC) GSK Consumer Healthcare CASE studentship, and Professor Alexander's Engineering and Physical Research Council (EPSRC) Leadership Fellowship.

2. New research grant: bacteria resistant polymers

A prestigious new Wellcome Trust Investigator grant awarded to **Morgan Alexander (Pharmacy) and Paul William (Life Sciences)**. These are the first awards of their kind for the University of Nottingham.

Researchers who discovered a group of new materials capable of repelling bacteria have each won a prestigious research award worth a combined £2m to find out why.

Their bacteria resistant polymers could lead to a significant reduction in hospital infections acquired through implanted medical devices and improve the health care of hospital patients across the globe. Morgan Alexander, Professor of Biomedical Surfaces in the School of Pharmacy and Paul Williams, Professor of Molecular Microbiology, in the School of Life Sciences at The University of Nottingham, have each received a Wellcome Trust Senior Investigator Award for a joint project to understand why bacteria take such a dislike to their newly discovered polymers. These are the first awards of their kind for the University.

Controlling the number of infections acquired through indwelling medical devices – such as catheters, intravenous tubes and artificial joints – could significantly reduce the number of medical complications, save thousands of lives a year and reduce medical costs. These Senior Investigator Awards will fund a centre of excellence which will study

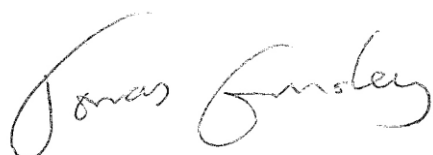
the underlying mechanisms behind the resistance these materials show to bacterial attachment and biofilm development.

Professor Alexander said: "We have a challenging five years ahead of us. The polymer material chemistries could not have been predicted from our current understanding of bacterial responses to materials. We will develop new analytical approaches to elucidate the mechanisms by which these polymers resist bacterial attachment encompassing the material and the cells."

Professor Williams said: "Bacteria are highly adaptable micro-organisms and we need to discover the genetic basis of how they sense and respond to chemically distinct polymer surfaces. By combining our expertise in materials science and microbiology we are taking an interdisciplinary approach to solving a major medical problem."

New discovery took them by surprise

Bacteria are attracted to implanted medical devices where they attach as single cells and grow as microcolonies eventually forming 'slime cities' or biofilms. Within these biofilms the bugs can hide to avoid detection and are protected from attack by the body's own immune defences and antibiotics. In the process of developing a new high-throughput approach to the study of bacterial attachment to hundreds of materials Professors Alexander and Williams and their team discovered a group of polymers that had the ability to reduce bacterial attachment– something that they had hoped for but was far from guaranteed at the outset. After further investigation they discovered that by coating silicone devices with these 'hit' materials there was a reduction of nearly 97 per cent in the surface area covered by bacteria compared with commercially available clinical devices. In August 2012 they published their discovery in Nature Biotechnology.



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- **Highlighted Papers**
- **Collated Research Papers:**

[Evaluation of skeletal tissue repair, Part 1: Assessment of novel growth-factor-releasing hydrogels in an ex vivo chick femur defect model](#)

E.L. Smith, J.M. Kanczler, D. Gothard, C.A. Roberts, J.A. Wells, L.J. White, O. Qutachi, M.J. Sawkins, H. Peto, H. Rashidi, L. Rojo, M.M. Stevens, A.J. El Haj, F.R.A.J. Rose, K.M. Shakesheff, R.O.C. Oreffo

Acta Biomaterialia (2014) available online DOI: 10.1016/j.actbio.2014.06.011

[Structural characterization of the apo form and NADH binary complex of human lactate dehydrogenase](#)

Sally Dempster, Stephen Harper, John E. Moses and Ingrid Dreveny
Acta Crystallographica (2014) D70, 1484-1490 DOI:10.1107/S1399004714005422

[Thermally Switchable Polymers Achieve Controlled Escherichia coli Detachment](#)

Andrew L. Hook, Chien-Yi Chang, David J. Scurr, Robert Langer, Daniel G. Anderson,
Paul Williams, Martyn C. Davies and Morgan R. Alexander
Advanced Healthcare Materials (2014) 3, 1020-1025 DOI: 10.1002/adhm.201300518

[Folic acid handling by the human gut: implications for food fortification and supplementation1-3](#)

Imran Patanwala, Maria J King, David A Barrett, John Rose, Ralph Jackson, Mark
Hudson, Mark Philo, Jack R Dainty, Anthony JA Wright, Paul M Finglas and David E Jones
The American Journal of Clinical Nutrition (2014) 100, 593-599
DOI:10.3945/ajcn.113.080507

[Human airway smooth muscle maintain in situ cell orientation and phenotype when cultured on aligned electrospun scaffolds](#)

G. E. Morris, J. C. Bridge, O. M. I. Eltboli, A. J. Knox, J. W. Aylott, C. E. Brightling,
A. M. Ghaemmaghami and F. R. A. J. Rose
Am J Physiol Lung Cell Mol Physiol (2014) 307, L38-L47
DOI:10.1152/ajplung.00318.2013

[New Insights into Electrocatalysis Based on Plasmon Resonance for the Real-Time Monitoring of Catalytic Events on Single Gold Nanorods](#)

Chao Jing, Frankie James Rawson, Hao Zhou, Xin Shi, Wen-Hui Li, Da-Wei Li and Yi-Tao
Long
Analytical Chemistry (2014) 86, 5513-5518 DOI: 10.1021/ac500785

[Surface Molecular Tailoring Using pH-Switchable Supramolecular Dendron-Ligand Assemblies](#)

Parvez Iqbal, Frankie J. Rawson, Watson K.-W. Ho, Siu-Fung Lee, Ken Cham-Fai Leung,
Xingyong Wang, Akash Beri, Jon A. Preece, Jing Ma and Paula M. Mendes
ACS Applied Materials & Interfaces (2014) 6, 6264-6274 DOI: 10.1021/am501613c

[Reversal of Ampicillin Resistance in MRSA via Inhibition of Penicillin-Binding Protein 2a by Acalypha wilkesiana](#)

Carolina Santiago, Ee Leen Pang, Kuan-Hon Lim, Hwei-San Loh, and Kang Nee Ting
BioMed Research International (2014) available online DOI: 10.1155/2014/965348

[Real-time electrocatalytic sensing of cellular respiration](#)

Nga-Chi Yip, Frankie J Rawson, Chi Wai Tsang, Paula M Mendes
Biosensors and Bioelectronics (2014) 57, 303-309 DOI: 10.1016/j.bios.2014.01.059

[Comparing women pharmacy consumers' experiences with weight loss treatment in Victoria and Nottingham: a cross-sectional study](#)

Souhiela Fakhri, Jennifer L Marriott, Helen Boardman, Claire Anderson and Safeera Y Hussainy
BMC Public Health (2014) 14, 662 DOI: 10.1186/1471-2458-14-662

[Bimolecular porous supramolecular networks deposited from solution on layered materials: graphite, boron nitride and molybdenum disulphide](#)

Vladimir V. Korolkov, Simon A. Svatek, Stephanie Allen, Clive J. Roberts, Saul J. B. Tendler, Takashi Taniguchi, Kenji Watanabe, Neil R. Champness and Peter H. Beton
Chem. Commun. (2014) 50, 8882-85 DOI: 10.1039/c4cc03720k

[Fish oil omega-3 fatty acids partially prevent lipid-induced insulin resistance in human skeletal muscle without limiting acylcarnitine accumulation](#)

Francis B. Stephens, Buddhike Mendis, Chris E. Shannon, Scott Cooper, Catharine A. Ortori, David A. Barrett, Peter Mansell and Kostas Tsintzas
Clinical Science (2014) 127, 315-322 DOI: 10.1042/CS20140031

[A biodegradable antibiotic-impregnated scaffold to prevent Osteomyelitis in a contaminated in vivo bone defect model](#)

J.S. McLaren, L.J. White, H.C. Cox, W. Ashraf, C.V. Rahman, G.W. Blunn, A.E. Goodship, R.A. Quirk, K.M. Shakesheff, R. Bayston and B.E. Scammell
European Cells and Materials (2014) 27, 332-349

[Novel antitumour indole alkaloid, Jerantinine A, evokes potent G2/M cell cycle arrest targeting microtubules](#)

Vijay J. Raja, Kuan-Hon Lim, Chee-Onn Leong, Toh-Seok Kam and Tracey D. Bradshaw
Invest New Drugs(2014) available online DOI: 10.1007/s10637-014-0126-1

[High throughput screening for biomaterials discovery](#)

Mohammed S. Algahtani, David J. Scurr, Andrew L. Hook, Daniel G. Anderson, Robert S. Langer, Jonathan C. Burley, Morgan R. Alexander and Martyn C. Davies
Journal of Controlled Release (2014) available online
DOI: 10.1016/j.jconrel.2014.06.045

[Real time Raman imaging to understand dissolution performance of amorphous solid dispersions](#)

Francesco Tres, Kevin Treacher, Jonathan Booth, Les P. Hughes, Stephen A.C. Wren, Jonathan W. Aylott and Jonathan C. Burley

Journal of Controlled Release (2014) 188, 53-60 DOI: 10.1016/j.jconrel.2014.05.061

[Sucrose/Glucose Molecular Alloys by Cryomilling](#)

Andrew J. Megarry, Jonathan Booth and Jonathan Burley

Journal of Pharmaceutical Sciences (2014) 103, 2098-2106 DOI: 10.1002/jps.24027

[Bacteria-instructed synthesis of polymers for self-selective microbial binding and labelling](#)

E. Peter Magennis, Francisco Fernandez-Trillo, Cheng Sui, Sebastian G. Spain, David J. Bradshaw, David Churchley, Giuseppe Mantovani, Klaus Winzer and Cameron Alexander
Nature Materials (2014) available online DOI: 10.1038/NMAT3949

[Terpolymerization Kinetics of Amino Acid N-Carboxy Anhydrides](#)

Mischa Zelzer and Andreas Heise

Polymer Chemistry (2014) 52, 1228-1236 DOI: 10.1002/pola.27109

[Can we use quantitative methods to characterize pharmacy consultations with people with depression?](#)

Claire Anderson

Research in Social and Administrative Pharmacy (2014) 10, 595-597

DOI: 10.1016/j.sapharm.2013.08.008

[Dental pulp stem cells: function, isolation and applications in regenerative medicine](#)

Marco Tatullo, Massimo Marrelli, Kevin M. Shakesheff and Lisa J. White

J. Tissue Eng Regen Med (2014) available online DOI: 10.1002/term.1899

[Materials for stem cell factories of the future](#)

Adam D. Celiz, James G. W. Smith, Robert Langer, Daniel G. Anderson, David A. Winkler, David A. Barrett, Martyn C. Davies, Lorraine E. Young, Chris Denning and Morgan R. Alexander

Nature Materials (2014) 13, 570-579 DOI: 10.1038/NMAT3972

Staff Research News

- [Professor Cameron Alexander](#) has been:
 - Elected to join the EPSRC Strategic Advisory Team for Physical Sciences.
 - Invited to give a Plenary Lecture at the [10th International Symposium of Stimuli-Responsive Materials](#) (ISSRM) in Sonoma, California in October 2014
- [Professor Morgan Alexander](#) has been:
 - Invited to become a member of the Wellcome Basic Science Interview Panel
 - Invited to review panel of Institute of Engineering and Technology
 - Invited to give a plenary talk at the [Combi14](#) meeting in Cairns in October 2014.
- [Professor Claire Anderson](#) and [Dr Li-Chia Chen](#) were invited to give talks at the 2014 Forbidden City International Pharmacist Forum, Jiuhua Resort & Convention Center, Beijing, China, 18th May 2014:



- Claire Anderson - People's experiences of taking antidepressants
 - Claire Anderson - Pharmacy practice education
 - Li-Chia Chen - Valuing the invaluable? – The cost-effectiveness of pharmacy.
- [Professor Martyn Davies](#) has been invited to give a Plenary Lecture at the [9th Annual Meeting](#) of the Israeli Chapter of the Controlled Release Society which is being held in Maalot Tarshiha, Israel, from 9-11 September 2014.
 - [Professor Stephen Doughty](#) has been appointed as an institutional reviewer for Quality Assurance Agency for Higher Education (QAA Scotland).
 - [Professor Rachel Elliott](#) has been:
 - invited to be a member of the Royal College of Physician's Joint Speciality Committee on Clinical Pharmacology and Therapeutics working group, tasked with developing new initiatives to improve medication adherence, from April 2014.
 - appointed Economics correspondent for the Royal Pharmaceutical Society
 - appointed a member of the Royal Pharmaceutical Society expert panel for NICE value based assessment consultation

- [Dr Franco Falcone](#) has been appointed Associate Editor of Parasitology (speciality section of Frontiers in Veterinary Science and Frontiers in Microbiology).
- Dr [New Siu Yee](#) was invited as a Guest Speaker at the "Teh Tarik Seminar" in Monash University, Malaysia Campus in July. The title of her talk was '**Gold Nanoparticles-Based Screening Assay for Protein-Ligand Interactions**'
- [Professor Clive Roberts](#) has been invited to give a talk at the [IUPAC Nanomaterials and Human Health: Trends and Future Workshop](#) being held at The University of Kent on the 15th and 16th September 2014.
- [Dr Seb Spain](#) has been invited to give a talk at the [Recent Appointees in Polymer Science](#) (RAPS) meeting being in Reading on the 3rd-5th September 2014.

'As part of its development as a 'Royal College', the Royal Pharmaceutical Society (RPS) launched a Faculty for members in June 2013 to provide professional recognition and support for members 'to be the best they can be'. In January 2014 RPS Faculty Leads visited Nottingham University Hospitals (NUH) to see what impact this is having on practice, and met with the School to see how we can prepare our students for foundation practice, and continue to support them once they complete their MPharm.

The Faculty is an important step in the evolution of Pharmacy as a Profession – recognising not only practice skills, but also the importance of collaborative working, leadership and management, training and development, and research and evaluation as core areas for continuing development. The MPharm provides an ideal platform to nurture these skills, and as such the School is very pleased to be working with RPS and NUH as a Faculty Champion.

A full report of the visit to NUH can be found in the (Pharmaceutical Journal, volume 292, page 476, 4 May 2014) or please speak to [Gautam Paul](#), senior Teacher-Practitioner, who organised this. Gautam is now working with RPS to help scope and develop accreditation for Faculty foundation pharmacy practice, something that we are actively supporting as an alternative to the tried, tested, but perhaps rather 'worn-out' clinical diploma. Our ambition is that our 4 and 5 year MPharm graduates have all the scientific, clinical, professional and leadership skills and experience that they need for day 1 practice to make a real difference to patient care.

Not only is this a good opportunity to recognise this important collaborative work, but also to let you know you that Gautam has been appointed to a new University joint post as pre-registration facilitator for the 5 year MPharm, and advanced pharmacy practitioner at NUH for education and professional development, which commences in October. I am sure you will join with me in congratulating Gautam'

[Tom Gray](#)

Head of Professional and Clinical Leadership

Grants and Studentships

- [Professor Cameron Alexander](#) has been awarded £520k to purchase equipment for the School's new Centre for Doctoral Training in Advanced Therapeutics and Nanomedicine.
- [Professor Morgan Alexander](#) has been awarded a Wellcome Trust Senior Investigator grant for a joint project with Professor Paul Williams, Professor of Molecular Microbiology, School of Life Sciences, worth £2m.
- [Professor Rachel Elliott](#) and colleagues have been given £186k by East Midlands Academic Health Sciences Network to provide economic input to building cases for implementation of interventions already proven to be effective, around the region. This funding will support Dr Lukasz Tanajewski and a graduate health economics internship for two years.
- [Professor Peter Fischer](#) has been awarded approx. £738K from the MRC for a drug discovery project collaborating with the School of Life Science and drug discovery company Heptares.
- [Dr Beppe Mantovani](#) and [Dr Stephanie Allen](#) have both received Impact Acceleration funding from the EPSRC to carry out feasibility studies in pharmaceutical science.
- [Professor Phil Williams](#), [Dr Pavel Gershkovich](#) and [Dr Li-Chia Chen](#) were awarded Wellcome Trust Vacation Scholarships which allowed three of the School's MPharm students to undertake short research projects during the summer.

Student News

- Postgraduate student Blessing Airhihen (née Oveh) was awarded a renewal of her Faculty for the Future Scholarship from the Schlumberger Foundation.
- Kuldeep Bansal, PhD student in the Division of Drug Delivery and Tissue Engineering, was awarded the prize for best poster at the UKICRS Annual Symposium held in Cork, 10th-11th April 2014.
- Georgios Gkountouras, health economist graduate intern in the Division of Social Research in Medicines and Health, has been successful in obtaining a VC Scholarship to do a PhD in Economics of Medicines Use with Professor Rachel Elliott.
- Hiteshri Makwana, PhD student in the Laboratory of Biophysics and Surface Analysis Division, was awarded the prize for best oral presentation at the UKICRS Annual Symposium held in Cork, 10th-11th April 2014.

Highlighted Papers

- Dr Tracey Bradshaw would like to congratulate her student Vijay Raja who has worked hard to elucidate mechanisms of antitumour action of novel Malaysian rainforest alkaloid – Jerantinine A. He has just had his manuscript accepted for publication in *Investigational New Drugs* (2014) – DOI: [10.1007/s10637-014-0126-1](https://doi.org/10.1007/s10637-014-0126-1).
- “Bacteria-instructed synthesis of polymers for self-selective microbial binding and labelling” by E. Peter Magennis, Francisco Fernandez-Trillo, Cheng Sui, Sebastian G. Spain, David J. Bradshaw, David Churchley, Giuseppe Mantovani, Klaus Winzer & Cameron Alexander which is now out *Nature Materials* (2014) - DOI: [10.1038/nmat3949](https://doi.org/10.1038/nmat3949) and will feature in a News and Views special in *Nature Materials*. “We have also been interviewed by Radio 4 Today concerning this paper and our recent *Nature Chemistry* 2013”.
- “Targeting *Staphylococcus aureus* Quorum Sensing with Nonpeptidic Small Molecule Inhibitors” by Ewan J. Murray, Rebecca C. Crowley, Alex Truman, Simon R. Clarke, James A. Cottam, Gopal P. Jadhav, Victoria R. Steele, Paul O’Shea, Catharina Lindholm, Alan Cockayne, Siri Ram Chhabra, Weng C. Chan and Paul Williams was published in *Journal of Medicinal Chemistry* (2014) – DOI: [10.1021/jm500215s](https://doi.org/10.1021/jm500215s).
- “A metabolomics investigation into the effects of HIV protease inhibitors on HPV16 E6 expressing cervical carcinoma cells” by Dong-Hyun Kim, J. William Allwood, Rowan E. Morre, Emma Marsden-Edwards, Warwick B. Dunn, Yun Xu, Lynne Hampson, Ian N. Hampson and Royston Goodacre was published in *Molecular BioSystems* (2014) – DOI: [10.1039/C3MB70423H](https://doi.org/10.1039/C3MB70423H) was selected as a HOT article by the Journal and highlighted on the [Molecular BioSystems blog](#).
- “Cost effectiveness of a pharmacist-led IT-based intervention with simple feedback in reducing rates of clinically important errors in medicines management in general practices (PINCER)” by Rachel A Elliott, Koen Putman, Matthew Franklin, Lieven Annemans, Nick Verhaeghe, Martin Eden, Jasdeep Hayre, Sarah Rodgers, Aziz Sheikh, Anthony J Avery. *Pharmacoeconomics* March 2014. DOI: [10.1007/s40273-014-0148-8](https://doi.org/10.1007/s40273-014-0148-8)
- “Research into practice: safe prescribing” by Anthony J Avery, Sarah Rodgers, Bryony Dean Franklin, Rachel A Elliott, Rachel Howard, Sarah P Slight, Glen Swanwick, Richard Knox, Gill Gookey, Nick Barber, and Aziz Sheikh. *British Journal of General Practice* May 2014 64:259-261. DOI: [10.3399/bjgp14X679895](https://doi.org/10.3399/bjgp14X679895)
- “Identifying patient-level health and social care costs for older adults discharged from acute medical units in England” by Matthew Franklin, Vladislav Berdunov, Judi Edmans, Simon Conroy, John RF Gladman, Lukasz Tanajewski, Georgios Gkountouras, Rachel A Elliott.* *Age and Ageing* 2014. In print.
- Department of Health Policy Research Programme Project 'Understanding and Appraising the New Medicines Service in the NHS in England (029/0124)' A randomised controlled trial and economic evaluation with qualitative appraisal

comparing the effectiveness and cost effectiveness of the New Medicine Service in community pharmacies in England by Rachel A Elliott, Matthew Boyd, Justin Waring, Nick Barber, Rajnikant Mehta, Antony Chuter, Anthony J Avery, Lukasz Tanajewski, James Davies, Nde-Eshimuni Salema, Asam Latif, Georgios Gkountouras, Christopher Craig, Deborah Watmough. Submitted 31st March 2014.

- "Mechanism of phosphatidylserine inhibition of IgE/FcεRI-dependent anaphylactic human basophil degranulation via CD300a" by Vito Sabato, Monica, Saifa Shubber, Chris H. Bridts, Akira Shibuya, Luc S. De Clerk, Franco H. Falcone and Didier G. Ebo will be published as a Letter to the Editor in the Journal of Allergy and Clinical Immunology (2014) – DOI: [1016/j.jaci.2014.03.029](https://doi.org/10.1016/j.jaci.2014.03.029).
- "Helminth allergens, parasite-specific IgE, and its protective role in human immunity" by Colin Matthew Fitzsimmons, Franco Harald Falcone and David William Dunne was published in Frontiers in Immunology (2014) – DOI: [10.3389/fimmu.2014.00061](https://doi.org/10.3389/fimmu.2014.00061).
- "Serological Screening of the *Schistosoma mansoni* Adult Worm Proteome" by Fernanda Ludolf, Paola R. Patrocínio, Rodrigo Corrêa-Oliveira, Andréa Gazzinelli, Franco H. Falcone, André Teixeira-Ferreira, Jonas Perales, Guilherme C. Oliveira and Rosiane A. Silva-Pereira was published in PLOS Neglected Tropical Diseases (2014) – DOI: [10.1371/journal.pntd.0002745](https://doi.org/10.1371/journal.pntd.0002745).