

## The IBS and the DMMC, a Strategy for Translational Research

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The *Institute of Biopharmaceutical Sciences* (IBS) at the Royal College of Surgeons in Ireland was created in 1999 with funding from the Higher Education Authority under Cycle 1 of its PRTL1 programme. The IBS is a constituent research institute of the DMMC and, together with its sister institutes in UCD (Conway Institute) and TCD (Institute of Molecular Medicine), coordinates the PRTL1 Cycle 3 Programme for Human Genomics.



The research strategy of the IBS is to integrate basic and clinical sciences towards a better understanding, detection and enhanced treatment of specific diseases prevalent in Ireland. To deliver on this objective, the IBS supports research programmes between clinicians and scientists across the DMMC research institutes and associated hospitals. These programmes are supported by core technology facilities in proteomics, bioinformatics, mass spectrometry, peptide synthesis, and cell imaging.

The IBS is a multi-site research infrastructure encompassing the research activities of the College at the St. Stephen's Green campus and the RCSI-

Education and Research Centre (ERC) at Beaumont Hospital. The research infrastructure at RCSI which has been developed or supported by the IBS includes:

- o New biomedical research laboratories in York House opened in November 2004
- o Cellular Neuroscience Research Labs in York House
- o Molecular Medicine Research Labs at Beaumont Hospital
- o Centre for Advanced Drug Delivery
- o Centre for Human Proteomics
- o School of Pharmacy
- o Clinical Research Centre at Beaumont Hospital

Over the period of the Cycle 3 Programme for Human Genomics (2003-2007), IBS will invest over €22M in supporting new research staff, developing education and outreach programmes in molecular medicine, commissioning state-of-the-art technology and the building of new laboratories in York House and in the ERC, Beaumont Hospital. Through this infrastructure of labs, core technology platforms and staff, the IBS aims to facilitate and develop sustainable research programmes in Translational Research in the areas of Neuroscience, Respiratory Medicine, Cardiovascular and Tumour Biology.

Translational Research is best described as 'bench' experiments being driven by clinical questions and the findings from the 'bench' being put into practice in better diagnosis and treatment at the 'bedside'. Traditionally, clinical and scientific research are rarely intertwined and experimental hypotheses and protocols in basic and clinical research have rarely

## DMMC News

*DMMC News* is a forum for the molecular medicine community in Dublin to present the latest developments of interest to a local and international audience.

*DMMC News* is circulated widely in Dublin and to contacts further afield; it is also available to all from the DMMC website ([www.dmmc.ie/DMMC\\_News.htm](http://www.dmmc.ie/DMMC_News.htm)). It is an opportunity to present research, in the context of the developing cross-institutional collaborative environment, to fellow scientists and clinicians, funding agencies, government bodies, and the public. *DMMC News* also contains listings of events (seminars, meetings, courses and workshops). Contact [info@dmmc.ie](mailto:info@dmmc.ie) to contribute to future issues.

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been informed by each other. There are complex obstacles to translational research besides the current funding patterns and lack of clinician-scientist career structures which favour the separation of clinical and basic research and promote the segregation of hospital and research labs. The major challenges facing the IBS and DMMC in developing and sustaining clinician-scientist translational research are summarised below.

### Challenges facing translational research

- o Translation is not straightforward and requires a long-haul commitment.
- o Translation is hindered by insufficient targeted funding
- o Shortage of qualified researchers and practically non-existence of clinician-scientists
- o Academic and funding culture hinders clinician-scientist collaboration
- o Departmental-based research does not favour interdisciplinarity
- o Legal and ethical burden

Through the investment available in the Programme for Human Genomics and future funding initiatives, the DMMC and associated hospitals are uniquely placed in the Irish research scene to drive Translational research with 'in-house' expertise for the betterment of disease detection and treatment.

## St Vincent's University Hospital Research Symposium

The St Vincent's University Hospital (SVUH) Education & Research Centre Annual Research Symposium was held on 12 November 2004. Prof Larry Loeb (University of Washington, Seattle) opened the first session on *basic molecular mechanisms in malignancy* with a thought-provoking talk on the possibility of an inherent mutator phenotype within stem cells. Dr Bill Watson (Conway Institute, UCD) described approaches to combating cell resistance to apoptosis in prostate cancer. These included knock-out of hypoxia-inducible factors, targeting androgen-independent mitochondrial-mediated cell death, antisense knock-out of inhibitors of apoptosis proteins and anti-oxidation strategies via phytoestrogens. In a presentation on models of breast cancer progression, Dr Louise Flanagan (Conway, UCD) highlighted the likely diversity of cell types and the critical nature of metastasis. The session concluded with oral presentations by Craig Slattery (Conway, UCD) on how PKC B inhibition blocks drug-induced epithelial-mesenchymal

transition in chronic renal disease and by Jacintha O'Sullivan (SVUH) on the use of telomere shortening as a biomarker for ulcerative colitis.

Dr Aideen Long (RCSI) opened the second session with a description of studies of the role of the trans-membrane adhesion molecule CD44 in cancer and inflammation. There followed three oral poster presentations by Dr Lucy Golden-Mason (SVUH; on the use of pre-transplant CD56<sup>+</sup> cell levels to predict post-operative outcomes), by Zenia Martin (NUIG; on the use of a superoxidedismutase model to study gene expression responses to anti-oxidants in human vascular smooth muscle), and by Dr Elizabeth Ryan (Sanofi-Aventis; on the induction of maturation of semi-mature dendritic cells via a novel C-type lectin). Dr John Crown (SVUH) closed the session with a review of current status of cancer therapy strategies.

Prof Alisa Koch (University of Michigan) presented studies of angiogenesis in rheumatoid arthritis and Prof Catherine Godson (Conway, UCD) outlined the role of endogenous lipoxins in balancing mediation and resolution of inflammation. Returning to the theme of apoptosis, Dr Rosemary O'Connor (UCC) described novel IGF-1 pathways that mediate cell survival signalling. Six more short talks concluded the oral poster presentations, which were judged by Dr Steve Simpson (Associate Editor, Science) and Prof Stephen Pennington (Conway, UCD). The meeting concluded with a panel discussion on translational research which covered topics such as patient stratification, role of clinician-scientists, information management, ethical considerations and funding issues.

## XII<sup>th</sup> World Congress on Psychiatric Genetics, Dublin

Aisling Mulligan & Derek Morris, TCD

In October 2004 the Neuropsychiatric Genetics Group, Trinity College Dublin, under the chairmanship of Prof Michael Gill, hosted the XII<sup>th</sup> World Congress on Psychiatric Genetics. This is an annual meeting of the International Society of Psychiatric Genetics (ISPG). The meeting was an enormous success with 750 delegates, 5 plenary speakers, 32 symposia speakers, 75 oral presentations and over 500 posters. The conference began with a session for the general public, titled *Genes and Mental Health*. There was a full attendance, with lectures given by Prof Andrew Greene (UCD), Prof Michael Conneally (Indiana University) and Prof Michael Gill.

The conference was officially opened by Dr Ruth Barrington from the Health Research Board, and the first plenary session was given by Prof Stephen O'Rahilly (University of Cambridge) on 'Insights into the control of body weight from human and mouse genetics'. Over the following days, plenary sessions were given by Prof Terrie Moffit and Prof Avshalom Caspi (Institute of Psychiatry, London) on 'Interactions between environmental and genetic risk factors' and Prof Tim Tully (Cold Spring Harbor Laboratory) on the 'Biological basis of memory'. In addition there were presentations that showcased the latest findings in the genetics, genomics and molecular biology of the affective disorders, schizophrenia, anxiety disorders, alcohol/substance dependence, Alzheimer's disease, developmental disorders, and disorders presenting in childhood. Scientific fields of interest included bioethics, neurobiology and neuroscience, model systems, population genetics, bioinformatics and functional genomics.



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From left, Minister Mary Harney, Prof Michael Gill and Prof Michael Conneally.

Social events included a state reception hosted by the Minister for Health, Ms Mary Harney in Dublin Castle. The conference party was held in the Guinness Storehouse where the ISPG Lifetime Achievement Award was presented to Prof Peter Propping (University of Bonn) and the Theodore Reich Young Investigator Award was presented to Dr Carol Prescott of Virginia Commonwealth University.

## Metabolomics in Nutrition Workshop

Mike Gibney, TCD

For five days, from Monday 4<sup>th</sup> to Friday 10<sup>th</sup> of January 2005, 22 participants from 7 countries were immersed in an intensive training programme on *Metabolomics and Nutrition* at the Trinity Centre for Health Sciences, St. James's Hospital. The

workshop was part of the training programme of the EU FP6 integrated project on diet, genes and the metabolic syndrome which is TCD coordinated ([www.lipgene.tcd.ie](http://www.lipgene.tcd.ie)). Its planning drew on the experience of the DMMC (Paul Harkin) and involved both TCD (Mike Gibney & Helen Roche) and UCD (Lorraine Brennan and Philip Newsholme). Several stage-setting lectures kicked off the week with an introduction to metabolomics in nutrition by Mike Gibney (TCD) followed by keynote lectures from Bruce German (UC Davis) on 'Personalized Nutrition' and from Ben van Ommen (TNO, Zeist) on 'Systems biology in Nutrition'.

Several technology platform companies contributed to a session on the metabolomic technologies of Mass Spectrometry (MS) and NMR (Bruker Biospin, Bruker Daltronics, AGB Thermo, Waters). Speakers from The Conway Institute, UCD (Prof Paul Malthouse, Dr Lorraine Brennan and Dr Chandral Hewage) tackled NMR while investigators from RCSI (Dr Achim Treumann) and Leiden University (Dr Thomas Hankemeier) addressed MS technologies.

Three experienced practitioners of metabolomics gave substantial lectures: Environmental Toxicology from Dr Mark Viant (Birmingham University) and Pharmacology from Dr Elaine Holmes (Imperial College London) and Prof Ian Wilson (Astra Zeneca). Two full days were devoted to chemometric analysis of NMR and MS metabolomics output, covering both the theory (Prof Johan Trygg of the University of Umea) and hands-on practice (Mark Earll, Umetrics UK).

The overall rating of the workshop from all participants was very high and it was flattering to receive a request from Steve Zeissel of the University of North Carolina to run the workshop in the US. The Lipgene project covered most of the costs including 10 scholarships of € 500 each, with the FP6 Network of Excellence NuGO (European Nutrigenomics Network: [www.nugo.org](http://www.nugo.org)) also providing 10 similar scholarships. Waters kindly provided some valuable financial support and the DMMC staff played a key organizational role in planning. The complex work and social program ran beautifully, thanks to the huge effort of Jo Gibney, TCD.

This was a unique event which will allow the DMMC partners to develop their fledgling collaborative research in metabolomics and hopefully build it into something big. The NIH roadmap has highlighted metabolomics as a key tool of the future, along with the development of a library of small molecules which will be an essential part of this initiative.

## Havard Medical School - Partners HealthCare Centre for Genetics & Genomics (HPCGG)

Pierre Meulien, DMMC

The need for partnership in academia and the hospital sector to make the best use of new technologies, close the gap between basic research and the clinic, and build critical mass for collaborations with industry was exemplified during a recent trip to Boston. I was invited by Kevin Sanders (Hewlett Packard) and Raju Kucherlapati (Director of HPCGG) to visit them for two days at the beginning of January. HPCGG (<http://www.hpcgg.org>) was set up as a partnership between Harvard Medical School and Partners Healthcare involving the two main teaching hospitals in Massachusetts, (Brigham and Women's Hospital and Massachusetts General Hospital) and several other local hospitals.

The overall aim of this partnership is to bring modern technologies closer to patient care by developing the science/clinic interface. In order to achieve this, the hospitals have funded the HPCGG which provides services and technology to both clinical teams and research projects. The technology platforms are centralised in a dedicated facility that includes around 40–50 people, responsible for Arrays; DNA Sequencing; Proteomics; Biocollection Services; Bioinformatics; etc., all supported by a dedicated IT group lead by Sandy Aronson.

The same building houses a molecular medicine laboratory, developing new diagnostics, that recently launched the first clinical test for detection of mutations in the kinase domain of Epidermal Growth Factor Receptor (EGFR). This test is currently being used to select patients in a targeted clinical trial with Iressa, a kinase inhibitor from Astra-Zeneca. A large project has been initiated with Hewlett-Packard as partners to provide genomics/informatics solutions to a wide clinical research community across HPCGG. This will have far reaching implications for how clinical research will be performed in the Boston/Cambridge area over the next decade.

As we can see, partnerships between medical schools, hospitals, and biomedical research laboratories are cropping up all over the world. We are working to make the DMMC partnership recognised internationally over time so that we can build strategic alliances with like-minded centres in Europe and North America.

## ProteinChip Facility Opens at the Conway Institute

Linda Whelan & William Gallagher, UCD

In December 2003, three Principal Investigators at the Conway Institute, UCD (Dr William Gallagher, Prof Finian Martin and Prof Cliona O'Farrelly) received substantial funding from the Health Research Board under its Equipment Grant scheme to establish Ireland's first ProteinChip facility. This facility, which represents a valuable addition to the clinical proteomics suite of the Conway Proteomics Research Centre, will be an important resource not only for the research programme of scientists at the Conway Institute, but for Irish scientists as a whole. The acquired instrumentation utilises surface enhanced laser desorption/ionisation (SELDI) technology, in combination with time-of-flight mass spectrometry (ToF-MS), to facilitate protein profiling of complex biological and clinical samples<sup>1-5</sup>. Key projects already under investigation using this technology at the Conway



Institute include identification of novel markers of rejection in the serum of kidney and liver transplant patients, and studies aiming to better understand age-related diseases at the molecular level.

The ProteinChip facility was officially launched on 19 October 2004, with a one-day symposium. More than 80 participants attended from various institutions around Ireland. A range of speakers from basic and clinical science, as well as industry and academia, discussed the application of SELDI technology in biomedical science. SELDI offers a rapid and reproducible method to analyse proteins from crude biological samples. A potential advantage of SELDI is that it facilitates transition from discovery to assay on a single platform. Samples do not generally require complicated treatment prior to analysis and can be applied in small amounts. The overall process involves binding of a crude or fractionated sample to commercially available ProteinChip arrays, which are available in chromatographic and pre-activated format. Following removal of unbound proteins/contaminants/buffers, an energy-absorbing matrix is applied to the array surface. The ProteinChip is then

analysed by mass spectrometry, which generates a profile of the molecular entities present on the surface, primarily proteins, according to the mass and charge.

SELDI can be used to study a multitude of diseases from a wide variety of sample types including serum, urine, cell lysates, as well as intestinal and cerebrospinal fluids. To date, it is the only proteomics platform available for the complete process of biomarker discovery/protein expression and identification, validation, purification, characterisation and assay development. Some wider proteomics research applications include the study of antibody-antigen interaction, phosphorylation/signal transduction, toxicity markers, glycosylation and epitope mapping. At a commercial level, SELDI has demonstrated utility into both medical and basic research<sup>2</sup>. Current areas of research using ProteinChip technology include cardiovascular disease<sup>6</sup>, inflammation<sup>7</sup>, renal disease<sup>8</sup>, cancer<sup>1</sup>, and virology<sup>9</sup>.

The ProteinChip facility at the Conway can process more than 200 samples/day and is fully accessible to DMMC Investigators on a cost-recovery basis. Moreover, a substantially reduced rate for formalised training on the system is available. For more information, or a demonstration of the ProteinChip facility at the Conway Institute, please contact [william.gallagher@ucd.ie](mailto:william.gallagher@ucd.ie) or [linda.whelan@ucd.ie](mailto:linda.whelan@ucd.ie). See [www.ciphergen.com](http://www.ciphergen.com) for general background on the system.

## Institute of Molecular Medicine Annual Meeting

The 7<sup>th</sup> Annual TCD Institute of Molecular Medicine Meeting took place at St James's Hospital over the 5<sup>th</sup> and 6<sup>th</sup> November 2004. In a keynote lecture Prof Luke O'Neill (TCD) overviewed research into the trans-membrane recognition molecules, Toll-like receptors and their role in both cancer and inflammatory disease. In the subsequent lecture, Dr Joe Keane (IMM, St James's) described some of the events that take place within the immune system after such molecules detect the presence of the tuberculosis causing mycobacterium. Dr Keane's group are studying apoptotic events associated with macrophage-mediated clearance that could lead to more effective vaccines. Prof Jochen Prehn (RCSI) detailed investigations designed to resolve apoptosis mechanisms both geographically and temporally.

Dr Colin Doherty (RCSI) opened a session on biobanking by offering his experiences from the first two years of the Irish Epilepsy Gene Biobank project. He described both scientific and logistical challenges which biobanking presents but outlined examples of the encouraging research leads that such resources facilitate. Prof Elaine Kay (Beaumont Hospital) highlighted one such challenge with a discussion on the issue of obtaining informed consent for translational science studies. Special guest speaker Dr Manolo Morentes (CNIO, Madrid) took up several of these themes as he described the experiences of Spanish investigators, who have to date collected over 20,000 samples from a 20-hospital network.

On day two, Prof Peter Ghazal (Edinburgh) offered a vision of systems biology research which he believes is turning the conventional organ/cell/molecule paradigm on its head. He outlined the statistical and data integration challenges resulting from having multiple variables from relatively few observations, and offered the perspective of the Scottish Centre for Genomic Technology. Prof Stephen Pennington (Conway, UCD) described how advances in proteomic technologies are allowing the identification of novel protein interactions that lie at the heart of disease progression.

Improving patient stratification was the unifying theme of the subsequent lectures with presentations on Hepatitis C (Dr Susan McKiernan), chronic lymphocytic leukaemia (Dr Amjad Hayat), chronic myeloid leukaemia (Dr Eibhlin Conneally) (all St James's) and acute myeloid leukaemia (Prof

1. Rubin, R. B. & M. Merchant. 2000. A rapid protein profiling system that speeds study of cancer and other diseases. *Am Clin Lab.* 19: 28-9.
2. Weinberger, S. R., E. A. Dalmasso & E. T. Fung. 2002. Current achievements using ProteinChip Array technology. *Curr Opin Chem Biol.* 6: 86-91.
3. Fung, E. T. & C. Enderwick. 2002. ProteinChip clinical proteomics: computational challenges and solutions. *Biotechniques.* Suppl: 34-8, 40-1.
4. Fung, E. T., et al. 2001. Protein biochips for differential profiling. *Curr Opin Biotechnol.* 12: 65-9.
5. Issaq, H. J., et al. 2002. The SELDI-TOF MS approach to proteomics: protein profiling and biomarker identification. *Biochem Biophys Res Commun.* 292: 587-92.
6. Stanley, B. A., et al. 2004. Heart disease, clinical proteomics and mass spectrometry. *Dis Markers.* 20: 167-78.
7. Gineste, C., et al. 2003. High-throughput proteomics and protein biomarker discovery in an experimental model of inflammatory hyperalgesia: effects of nimesulide. *Drugs.* 63 Suppl 1: 23-9.
8. Fung, E., et al. 2003. The use of SELDI ProteinChip array technology in renal disease research. *Methods Mol Med.* 86: 295-312.
9. Sun, B., H. C. Rempel & L. Pulliam. 2004. Loss of macrophage-secreted lysozyme in HIV-1-associated dementia detected by SELDI-TOF mass spectrometry. *Aids.* 18: 1009-12.

Bob Löwenburg, University of Utrecht). In the 5<sup>th</sup> Annual Durkan Lecture, Prof Löwenburg eloquently described the current difficulties in differentiating patients into low and high disease risk categories. This clinical dilemma – exposing patients to a significant risk of treatment-related mortality with no guarantee of efficacy - reflected similar sentiments offered by Prof Shaun McCann (IMM, St James's) in his review of 20 years of bone marrow transplantation at St James's Hospital.

## Collaborative Research into Hepatitis C

Cliona O'Farrelly, SVUH

The emergence of genomic, proteomic and bioinformatics technologies across Dublin enhances our ability to study disease progression at a molecular level. However these developments also highlight several additional challenges, not least the alignment of investigators around a shared research agenda to exploit these new resources. One longstanding collaboration into Hepatitis C virus (HCV) demonstrates how resources are being mobilised across the DMMC and beyond.

Over 1,600 Irish women were infected with HCV as a result of receiving contaminated blood and blood products in two incidents in 1977 and 1993. While public attention has rightly focused on how the tragedy occurred, scientists must address the consequences of these infections. The Irish cohort comprises at least two different infections (type 1b & type 3); the majority are type 1b but those infected in the 1990's are type 3. Less than half of all people infected exhibit a detectable antibody response (the anti-D cohort). Of these, 20% will develop chronic cirrhosis of the liver, some requiring liver transplantation, and a significant number will develop liver cancer. Less than half of those infected respond to antiviral treatments (which themselves carry unwanted side effects). The challenge for scientists is to better detect those at risk of developing a chronic infection, to identify which patients will respond to current therapy and to develop more effective treatments.

A 1998 Health Research Board programme grant brought together four leading Irish immunologists (Prof Dermot Kelleher, Prof Kingston Mills, Dr Derek Doherty, and Prof Cliona O'Farrelly), the Director of the Virus Reference Laboratory (Prof William Hall), and the Director of the National Liver Transplant Unit (Prof John Hegarty), to examine the immune response mechanisms associated with Hepatitis C infection. This research demonstrated that the

immune response of chronically infected HCV patients was compromised and laid the foundations for a further HRB Programme Grant awarded to the same group in 2003. For this study, researchers from two hospitals and from TCD, UCD and NUIM are involved in untangling the mechanisms by which HCV subverts the immune response. They are also exploiting gene array technologies at the Conway Institute (UCD) to identify signature patterns that might predict disease progression or response to therapy.

Genotyping studies led by Prof Dermot Kelleher and funded by the Wellcome Trust indicated that certain immune related genes influence disease progression. Hepatitis C investigators from St Vincent's and St James's Hospitals contributed to the research proposal that set up Ireland's first CIPHERGEN ProteinChip facility (see page 4 of this issue). This facility enables high throughput screening of clinical samples to reveal characteristic protein signatures, allowing targeted application of mass spectrometry expertise within the Conway Proteome Research Centre. The work is being progressed through additional funding, secured by proteomics Professors Steve Pennington and Mike Dunn in collaboration with Cliona O'Farrelly, to identify Biomarkers of drug responsiveness in chronic HCV infection.

Irish HCV researchers believe that gene and protein expression profiling will enable them to stratify patient populations and predict how their disease will progress and how they will respond to therapy. However, these expression signatures are confounded by genetic and environmental factors, therefore requiring large numbers of well defined samples. An Irish HCV Research Consortium involving all the hepatologists responsible for the anti-D cohort and chaired by Cliona O'Farrelly has been established to address these issues in a co-ordinated, collaborative fashion. An immunogenomic study instigated by Dr Clair Gardiner (TCD) in collaboration with the consortium will investigate the genotypes of Natural Killer (NK) cell surface proteins critical for the innate immune response to viruses including HCV in the anti-D cohort.

Prof Cliona O'Farrelly is sanguine about the prospects of HCV Research in Ireland. "The combination of carefully defined and documented patient cohorts, meticulously designed protocols executed using sophisticated technologies producing data that can be analysed by skilled bioinformaticians will yield meaningful results of relevance to the international research community and most importantly to the

better care of hepatitis C patients everywhere. This type of biomedical research is only possible with real collaborative effort as fostered through the DMMC”.

Apart from allowing access to technologies across the city, the appointment of Alison Byrne demonstrates how the DMMC is breaking down traditional partitions. Registered as a PhD student at TCD under the supervision of Dermot Kelleher and Cliona O’Farrelly, Alison is drawing on technology cores and academic expertise within the Conway Institute and IMM to study HCV patient response to therapy. She is working on patient samples from St James’s and St Vincent’s University Hospitals, in collaboration with the Proteomics team at the Conway, using bioinformatics resources within the St Vincent’s Education & Research Centre, in order to better understand the proteomic response to alpha interferon therapy in the anti-D cohort. Ms Byrne notes *“I’m so excited about this multi-centre research opportunity, I think it is actually possible that I might make a discovery that will influence patient care in the course of my PhD”*.

### ScienceWorks, Conway Institute

Elaine Quinn, UCD

The Conway Institute recently launched a new outreach initiative for secondary school pupils called *ScienceWorks*. Over 140 students from the greater Dublin area participated in this innovative programme, which is designed to encourage and foster an interest in the biosciences. The access-all-areas, interactive workshops proved a huge success with students, who grabbed this chance to see firsthand the reality of life in a research facility. Held during National Science Week (November 7–14 2004), *ScienceWorks* featured three main elements: Conway Uncovered, *Science@Work* and *Pathways2Science*. Each half-day workshop catered for up to 25 pupils.

*Conway Uncovered* took pupils on a guided tour of the research laboratories and core technology suites to witness Conway scientists at work. Next, in the *Science@Work* element, these aspiring young scientists donned white coats and got stuck into some hands-on experiments. With DNA-based forensic investigations, evolutionary biology and some fascinating chemistry ‘illusions’, there was no shortage of authentic scientific investigation on offer. Finally, in the *Pathways2Science* element of the workshops, pupils got the chance to meet three individuals with different roles within the Institute.

Postgraduate students, postdoctoral fellows, laboratory technicians, science communicators and lecturers spoke informally of their own pathway into science and described their current work. Stories of far-flung conference destinations, intriguing research techniques, high-tech equipment and TV appearances appealed greatly to students currently contemplating their leaving certificate subject choices.



Feedback from teachers and students has been extremely positive and some of the quotes clearly show the value of such outreach programmes in securing the future of science as a career option; *“It has changed my outlook on a career in science... it broke the stereotype I had of a lab”*; *“Science seems more interesting and broad than I thought”*; *“I always had an idea of scientists being old and complete geniuses but the people we met seemed very down to earth”*. The demand for this inaugural *ScienceWorks* programme exceeded all expectations and these workshops will now be held biannually. The next programme is planned for late April 2005.

### News In Brief...

#### Recent and upcoming DMMC Courses

Since the last DMMC News, DMMC Courses have been taking place across the city. In late November, the hands-on *Python Programming for Bioinformatics Analysis* course provided 40 participants with a fast-paced introduction to this object-oriented programming language. Thanks to Daan Archer and Bianca Tong for their tireless enthusiasm in putting together and delivering an excellent course. This was followed rapidly by *Techniques & Strategies in Molecular Medicine*, which once again attracted a large number of postgraduate students and staff from all DMMC partner institutions. A week-long course of hands-on computer modelling of membrane transport, pharmacokinetics, and pharmacodynamics runs in February. See <http://www.dmmc.ie/courses.htm> for more.

**Applications invited for 4-year PhD at TCD**

Supported by the Irish Health Research Board, this prestigious programme, *Molecular Medicine - From Genes to Function*, takes an integrated, multi-disciplinary approach to the training of scientists in molecular medicine. See the News section of the

DMMC website for details.

**IBS Website**

The new website (<http://www.inst-biopharmsci.org>) details research, employment opportunities, education and outreach activities at the Institute of Biopharmaceutical Sciences, RCSI.

**Events**

See [www.dmmc.ie](http://www.dmmc.ie) for more information on these and other events  
Please send details of forthcoming events to [info@dmmc.ie](mailto:info@dmmc.ie)

DATE (2005)	EVENT	LOCATION
2 Feb - 23 Mar	<b>DMMC Course: Immunobiology</b> <a href="http://www.dmmc.ie/courses.htm">www.dmmc.ie/courses.htm</a>	ERC, St Vincent's University Hospital
7 Feb - 1300 (Lunch at 1230)	<b>The influence of cannabinoids on neural fate</b> Dr Veronica Campbell (Physiology, TCD)	Durkan Theatre, IMM <sup>1</sup>
14 Feb - 1300 (Lunch at 1230)	<b>Genetic and molecular studies of the transcriptional coactivators PGC-1<math>\alpha</math> and PGC-1</b> Dr Vivion Crowley (Biochemistry, St James's Hospital)	Durkan Theatre, IMM <sup>1</sup>
17 Feb - 1300	<b>Cancer as an epigenetic disease: breaking the DNA methylation and histone code</b> Dr M Esteller (Director CNIO, Madrid)	Conway Institute <sup>2</sup>
21-25 Feb	<b>DMMC Course: Thermodynamics of Membrane Transport Physiology</b> (hands-on modelling of membrane transport, pharmacokinetics, and pharmacodynamics)	Education & Research Centre, Beaumont Hospital
21 Feb - 1300 (Lunch at 1230)	<b>Molecular signals regulating mammary epithelial cell assemblies</b> Prof Finian Martin (Conway Institute, UCD)	Durkan Theatre, IMM <sup>1</sup>
28 Feb - 1300 (Lunch at 1230)	<b>Histone deacetylases: from isolation of new complexes to therapeutic potential</b> Dr Steven Gray (IMM, TCD)	Durkan Theatre, IMM <sup>1</sup>
3 Mar - 1600	<b>Biochemistry and inhibition of intramembrane proteases</b> Prof Mike Wolfe (Harvard Medical School)	Conway Institute <sup>2</sup>
7 Mar - 1300 (Lunch at 1230)	<b>Exploration of gene-based therapies for inherited retinal degenerations</b> Dr Jane Farrar (Genetics, TCD)	Durkan Theatre, IMM <sup>1</sup>
14 Mar - 1300 (Lunch at 1230)	<b>Aspergillus and the compromised host: can the mould be broken?</b> Prof Tom Rogers (Microbiology, TCD)	Durkan Theatre, IMM <sup>1</sup>
15 - 16 Mar	<b>Neurodegeneration Ireland - Molecular Mechanisms of Neurodegeneration:</b> <a href="http://www.biochemistry.org/meetings">http://www.biochemistry.org/meetings</a> (with Satellite Symposium on 14 March)	O'Reilly Hall, UCD
21 Mar - 1300 (Lunch at 1230)	<b>Plasma protein pathways, inflammation and immunity</b> Dr John Jackson (IMM, TCD)	Durkan Theatre, IMM <sup>1</sup>
31 Mar - 1 Apr	<b>Cancer 2005 Meeting</b>	St. James's Hospital
4 Apr - 1300 (Lunch at 1230)	<b>Structure and function of coagulation factor V111</b> Dr Vince Jenkins (IMM, TCD)	Durkan Theatre, IMM <sup>1</sup>
5 - 8 Apr	<b>International Society for Cellular Oncology Conference</b>	Queen's University Belfast
18 Apr - 1300 (Lunch at 1230)	<b>Fishing for determinants of retinal development and blindness</b> Dr Breandan Kennedy (Conway Institute, UCD)	Durkan Theatre, IMM <sup>1</sup>
25 Apr - 1300 (Lunch at 1230)	<b>The origin of folate dependence</b> Dr Joe McPartlin (IMM, TCD)	Durkan Theatre, IMM <sup>1</sup>

<sup>1</sup> Institute of Molecular Medicine (IMM), St James's Hospital, Dublin 8

<sup>2</sup> Conway Institute of Biomolecular & Biomedical Research, UCD, Belfield, Dublin 4