3

Towards a Research-Intensive University

Research is of fundamental importance to the work of a university. For UCD to continue to succeed it must define itself in a highly competitive environment as a university where bold and imaginative educational programmes and excellence in teaching go hand-in-glove with a commitment to the discovery process, research and innovation.

Research is the activity that drives innovation and discovery to fuel Ireland's knowledge economy. UCD is committed to becoming a leading research-intensive university dedicated to the search for knowledge and marked by a spirit of critical enquiry. It is also becoming an institution where the intensity of research and dedication to scholarship drives and stimulates teaching and learning, and inspires students.

Research grants and income depend largely on institutional reputation. UCD continues to build its reputation as a destination of choice for leading research talent, providing an environment in which research leaders can innovate and excel.

As a research-intensive university, UCD offers a wide range of top quality undergraduate and postgraduate student-centred learning, which combine quality research with the best teaching and learning methods.

St John's Eve: this image was created by Noreen Barron, formerly of the UCD School of Irish, Celtic Studies, Irish Folklore and Linguistics and was overall winner of the UCD Images of Research Competition

UCD strives to advance knowledge through cutting-edge research in an environment that encourages and attracts world-class researchers from across the disciplinary spectrum. UCD is forging exciting educational and research partnerships and collaborations with academic institutions, commercial organisations, NGOs and government thereby enhancing confidence in UCD as a destination for quality investment from the public and private sectors.

Under the stewardship of Professor Michael Ryan, Dean of Doctoral Studies and Postdoctoral Training, 2006 saw the groundwork completed for the establishment of five new Graduate Schools. UCD is now a national leader in fourth-level postgraduate education. The introduction of the Schools marks the growth and development of fourth-level education at UCD. There are currently approximately 6,000 students enrolled in postgraduate study in UCD, accounting for over 20% of the total student population.

The UCD Graduate Schools are closely linked with UCD's Research Institutes and will foster collaborative programmes with different sectors and with leading universities around the world. A scheme for enhanced postdoctoral training and career development is being put in place in association with the UCD Graduate Schools and the UCD Research Institutes.

RESEARCH PUBLICATIONS

Details of all research publications for the period of the Report are available online at www.ucd.ie/research/publications

RESEARCH FUNDING

UCD has been successful in attracting significant increases in the volume and value of research contracts. In 2005/06 (October to September), UCD was awarded 664 contracts worth €82.9 million, an increase of a third over the previous year. The current level of proposals at 1,245 represents almost double the level of two years ago (see Tables 1 and 2).

In addition to the underlying normal grant activity, a number of major initiatives are underway including:

- The National Institute for Bioprocessing Research and Training (NIBRT): the total value of the award from IDA Ireland is €72 million and the funding agreement, which largely funds the building on the Belfield campus, targeted for completion in 2008, came into effect in June 2006. The NIBRT is a collaboration between UCD, TCD, DCU and IT Sligo;
- The National Digital Research Centre: a proposal to establish the NDRC (at a cost of €25 million) was awarded by the Department of Communications, Marine and Natural Resources to UCD and its partners TCD, DCU, NCAD and IADT Dun Laoghaire in 2006;
- UCD received almost €1 million from Servier Laboratories for a Chair in Molecular Pharmacology to develop a new programme in cardiovascular clinical research. UCD Vice-President for Research Professor Des Fitzgerald has expressed his pleasure that UCD has secured so prestigious a figure as Adjunct Professor Eoin O'Brien to be the first holder of the Chair.

In the second year of the prestigious Science Foundation Ireland President of Ireland Young Researcher Award (PIYRA) two UCD researchers were recognised in 2005, making UCD the institution with the highest number of PIYRA awards to date. These highly competitive awards provide up to €1 million to researchers to establish their own team within five years of receiving their PhD. The aim is to help top-tier young investigators develop careers as internationally recognised researchers. This success reflects the efforts of many senior researchers in UCD, who identified potential candidates, selected the short-list and supported the applicants through the process.

TABLE 1 – RESEARCH AWARDS

Year (October to September)	Total Value Contracts Signed Including Contributions to Overheads (€ million)	Total Contributions to Overheads (€ million)	Total Number of Contracts Awarded (€ million)	Number of Proposals Submitted
2002/03	45.8	4.5	384	584
2003/04	49.8	5.6	405	685
2004/05	62.5	8.1	495	1,074
2005/06	82.9	11.8	664	1,245

TABLE 2 – FUNDING SOURCES

Funding Source	Number of Contracts	Value (€ million)
Science Foundation Ireland (SFI)	110	22.8
Department of Agriculture and Food	39	11.2
European Commission	36	8.6
Health Research Board (HRB)	37	8.1
Enterprise Ireland (EI)	55	6.7
Irish Research Council for Science, Engineering and Technology (IRCSET)	86	5.2
Irish Research Council for the Humanities and Social Sciences (IRCHSS)	22	1.6
Environmental Protection Agency (EPA)	24	4.3
Others	255	14.4

UCD INTERNAL SCHEMES IN SUPPORT OF RESEARCH

For the period of this report a total of €2.4 million was awarded to UCD staff to facilitate the pursuit of research objectives across a range of internal schemes. The range of schemes provides researchers, at all stages of their careers, with practical support for research projects and ideas that are challenging and ambitious. The schemes include the Strategic and Major Initiatives Scheme, the Seed Funding Scheme and the President's Research Fellowships.

STRATEGIC AND MAJOR INITIATIVES SCHEME

One of UCD's strategic aims is to encourage interdisciplinary research and cross-campus programmes that will see UCD compete for major funding opportunities. Now in its second year, the UCD Strategic and Major Initiatives Scheme continues to encourage large scale strategic proposals that are likely to attract funding in excess of €10 million. This year the Scheme supported the Liberty Group to fund the feasibility study for The National Digital Research Centre (NDRC). The NDRC is a pioneering centre in the software technologies and digital media sphere in Ireland; uniquely focused on translational research, addressing the gap between university research and commercialisation. The Centre will primarily deal with the digital media domain in the specific areas of health, education, environment and entertainment. NDRC's core aim is to develop commercially viable intellectual property, licences and start-ups.

SEED FUNDING SCHEME

Now in its second year, the UCD Seed Funding Scheme provides researchers with exciting opportunities for internal funding. The Scheme aims to provide seed funding to researchers at all stages of their career to transform new ideas from early concepts into viable research projects. Projects that can successfully compete for subsequent external support are, in particular, supported.

In the first round for 2006, 310 researchers submitted applications, 45% of whom received funding (See Table 3). The total amount of funding available has risen from €465,000 in 2005, to €1.2m (for the 2006 calendar year). The success of this year's round represents a significant increase in the number of researchers applying for internal project support and an even more significant increase in the funding available for research initiatives.

TABLE 3 - SEED FUNDING SCHEME 2005/06

Programme	No. of Awards	Amount Awarded €
Interdisciplinary Funding (2005 only)	6	46,000
International Collaboration (2005 only)	10	39,000
Horizon Scanning	32	255,377
Dissemination and Outputs	56	109,537
Enterprise and Commercialisation	4	27,606
Small Equipment Award (2006 only)	24	328,597
Internal and External Collaboration (2006 only)	37	386,589
TOTAL	**169**	**1,192,706**

PRESIDENT'S RESEARCH FELLOWSHIPS

The President's Research Fellowships facilitate members of the academic staff who wish to avail of a leave of absence for research purposes, normally spent outside Ireland, thus helping underpin the university's strategy. In the period 2005 to 2006, seven successful applicants were awarded a total of almost €345,000 (See Table 4).

TABLE 4 - PRESIDENT'S RESEARCH FELLOWSHIPS

Researcher Full Name	School	College	Project Title	Amount Awarded
Professor Thomas Brazil	Electrical, Electronic and Mechanical Engineering	Engineering, Mathematical and Physical Sciences	Broadband, Nonlinear Modelling and Simulation of Wireless Systems	€50,011
Dr Judith Devlin	History and Archives	Arts and Celtic Studies	The Stalin Cult: Propaganda and Power in 20th Century Russia	€50,011
Dr Peter Duffy	Mathematical Sciences	Engineering, Mathematical and Physical Sciences	The Plasma Astrophysics of Relativistic Jets	€46,011
Dr William Gallagher	Biomolecular & Biomedical Science/ UCD Conway Institute	Life Sciences/ UCD Conway Institute	Breast Cancer Metastasis: Biomarkers and Functional Mediators	€50,011
Dr Fran O'Rourke	Philosophy	Human Sciences	Influence of Aristotle and Aquinas on James Joyce	€50,011
Dr Anthony Roche	English and Drama	Arts and Celtic Studies	Brian Friel's Irish Drama: Postnational, Postcatholic, Postcolonial	€48,311
Dr John Walsh	Geological Sciences	Engineering, Mathematical and Physical Sciences	Earthquake Clustering over Geological Timescales: Analysis and Modelling of Active Fault Systems from New Zealand	€50,011
TOTAL				€344,377

FOCUS ON RESEARCH

A new series of lunchtime sessions, Focus on Research, has been initiated to enable the Vice-President for Research and his team to meet and consult with the UCD research community. Typically the agenda for the sessions is broad and small numbers attend to enable an interactive discussion on research topics of common interest. The Focus on Research sessions are proving to be an effective consultative platform from which a deeper understanding of the issues, concerns and opportunities for research in UCD can be gained.

RESEARCH AWARDS

SFI Principal Investigator Career Advancement (PICA) Award

The PICA award is made to Irish-based researchers demonstrating scientific excellence who have interrupted their careers to take parental or other leave. In the inaugural year, three of a total of ten awards were made to UCD researchers - Dr Debra Laefer UCD School of Architecture, Landscape and Civil Engineering; Dr Orina Belton, UCD School of Medicine and Medical Sciences and the UCD Conway Institute and Dr Trudee Fair, UCD School of Agriculture, Food Science and Veterinary Medicine.

SFI President of Ireland Young Researcher Awards (PIYRA)

Two UCD researchers were among five recipients to receive over €4 million under the scheme. Launched in 2004, the PIYRAs highlight the critical roles played by innovative young researchers in developing contemporary research and education programmes for Ireland. UCD is the only Irish institution to have been awarded more than one award for the second year running.

PRESIDENT OF IRELAND YOUNG RESEARCHER AWARDS

Dr Jarlath E Nally

RESEARCH TITLE : ***Characterisation of the proteome and transcriptome of Leptospira during acute and chronic infection***

Dr Nally, UCD School of Agriculture, Food Science and Veterinary Medicine, was awarded €700,000 over a five-year period to fund his work on the pathogenesis of infectious diseases.

Approximately 25% of 57 million annual deaths worldwide are the direct result of infectious disease (WHO). In order to provide effective preventative vaccine and diagnostic strategies, it is critical to understand how infectious agents cause disease. Leptospirosis is the most geographically widespread zoonotic disease in the world, capable of infecting wild and domestic animals species, as well as humans. Dr Nally's research on the causative agent of leptospirosis (Weil's disease), *Leptospira Interrogans*, provides novel strategies to design safe vaccines. Research results also provide for the development of vaccines against other bacterial pathogens causing acute and chronic disease in populations throughout the world.

Dr Jarlath E Nally and President Mary McAleese

Dr Scott Rickard and President Mary McAleese

Dr Scott Rickard

RESEARCH TITLE : ***Time-frequency/time-scale analysis, sparse signal representation theory, and finite field theory for signal processing applications***

Dr Rickard, UCD School of Electrical, Electronic and Mechanical Engineering, was awarded nearly €1 million over a five period to fund his work on the application of time-frequency/scale analysis and sparse methods to problems in signal processing and information theory.

Dr Rickard's research for the past several years has focused on solving the 'cocktail party problem', which enables a computer to separate out one speaker from a noisy mixture of speakers. His solution, which is capable of separating ten speakers from a stereo mixture, has clear applicability in hearing aids and has applications in mixing systems such as separating the individual valve closing sounds from heart sounds, separating individual wireless signals to aid mobile phone communication, and separating SONAR signals from multiple sonobuoys for aiding underwater mapping.

In addition to his work on source separation, his PhD thesis at Princeton University developed new models of the changing communication path between mobile wireless transmitters and receivers. He is currently working on using these models to increase the reliability and data rates of mobile wireless communication systems. Dr Rickard is also keenly interested in science, mathematics and engineering education at all levels; he is co-founder of *www.sciencewithme.com* and co-creator of *www.roborugby.org*

Walton Visitor Awards

UCD was awarded two Science Foundation Ireland ETS Walton Visitor Awards which enable highly qualified academic and industrial researchers resident outside Ireland to carry out research projects of their own choice in Ireland. The ETS Walton Visitor Award was established to honour and perpetuate the legacy of Ireland's 1951 Nobel laureate in physics; the aim of the programme is to strengthen Ireland's connections to, and collaborations with, the international research community thereby enhancing Ireland's reputation and culture as a home of first-class research.

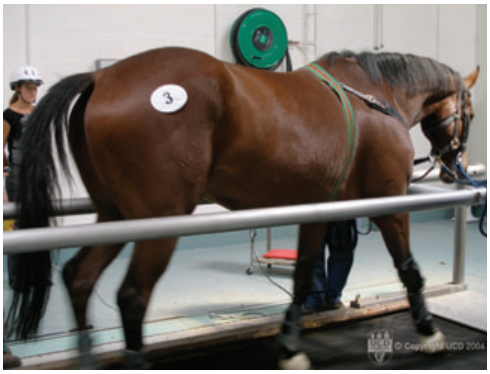
Lynn Ten Eyck, of the University of California, San Diego, under the sponsorship of Dr Jens Erik Nielsen, UCD School of Biomolecular and Biomedical Science, is focusing on *Modeling Protein Structural Variability*. Sara Linse, of Lund University, Sweden, under the sponsorship of Professor Ken Dawson, UCD School of Chemistry and Chemical Biology, is examining *Protein Interactions with Nanoparticles and in Cellular Signalling*.

Picture This... UCD Images of Research Competition

A UCD image competition that aimed to find the most innovative and imaginative research images from across the entire university was launched in March 2006. The competition was open to all in the research community, including researchers, academics, postdoctoral students, postgraduate students and research technicians. The competition encouraged everybody involved in research in UCD to submit compelling images created in the course of their research. Over 420 images were submitted to the competition with entries from all Schools and Research Institutes. Images will be used widely throughout the university to profile and promote the range and diversity of research taking place.

Record Funding for UCD School of Agriculture, Food Science and Veterinary Medicine

In a year of unprecedented funding success, the UCD School of Agriculture, Food Science and Veterinary Medicine obtained major research funding from a range of agencies and funding bodies including the Department of Agriculture and Food (FIRM and Research Stimulus), Science Foundation Ireland, Enterprise Ireland, EU Sixth Framework Programme, Environmental Protection Agency, Teagasc and commercial companies. In line with the national strategy to increase the number of trained postgraduate researchers, the School is in the process of recruiting upwards of 60 researchers, at postgraduate and postdoctoral level, across the thematic areas of animal science, food and health, pathobiology of disease, sustainable agriculture and veterinary clinical studies.



This image of a thoroughbred racehorse on a high speed treadmill prior to a performance evaluation was created by 2004 PIYRA winner, Dr Emmeline Hill, UCD School of Agriculture, Food Science and Veterinary Medicine and was submitted to the UCD Images of Research Competition

RESEARCH ACHIEVEMENTS

The *Oxford Glycan Sequencing Group* moved to UCD from Oxford University in August 2006 to kick-start the ambitious research and training programme of the newly founded National Institute for Bioprocessing Research and Training (NIBRT). This exciting development allows the formation of the Dublin-Oxford Glycobiology Laboratory and enables the group to expand its academic research and technology base, forming part of a glycobiology network for Ireland. The group will be led by Dr Pauline Rudd who will be the first NIBRT Professor to establish a research group in the NIBRT. In the last 10 years the Oxford Group has published more than 125 papers and has filed three patents. Its pioneering work has provided state-of-the-art technology for glycan analysis that is now used by many laboratories worldwide. Dr Rudd is the first of seven Principal Investigators to start at the NIBRT which aims to offer world-class training for scientists in industry and academia.

Maria McNamara undertaking fieldwork in northeastern Spain

An international research team, including postgraduate student *Maria McNamara*, UCD School of Geological Sciences, has extracted the first ever example of fossilised bone marrow from frogs and salamanders that died over 10 million years ago. The ground breaking discovery, reported in an article published in *Geology* - the Journal of the Geological Society of America, occurred while Ms McNamara was examining the fossils for the preservation of other soft tissues. Fortuitous fractures of the bones during the collection and archival process had exposed the marrow. Other exhumed fossils which may contain fossilised marrow may have been overlooked because the bones would have to be broken apart to expose it. The ancient bone marrow, discovered in the 10 million year old fossilised frogs and salamanders, was preserved in three dimensions as organic residue, retaining its original texture and red and yellow colour.

Dr Muiris O'Sullivan, Head of the UCD School of Archaeology was the author of a significant new book *Duma na nGiall, Tara, The Mound of the Hostages*. The book describes the archaeological excavations at the Mound of the Hostages (Duma na nGiall) on the Hill of Tara, Co Meath in the 1950s which was led by Seán P Ó Ríordáin and Ruaidhrí de Valera and is the result of fifteen years of investigation into the findings stored in the School. Dr O'Sullivan's book is the first comprehensive report on the findings which range from about 3500 BC.

The *UCD School of Archaeology* also completed a significant Foresight Report titled *Archaeology 2020: Repositioning Irish Archaeology in the Knowledge Society*. The report addressed the central issue of concern in Irish archaeology, the lack of connection between the vast amount of information generated and the key purpose of archaeology which is the creation of knowledge and understanding about the past. The report was informed by a consultative forum of decision makers and prepared by Professor Gabriel Cooney, Dr Muiris O'Sullivan and Dr Liam Downey, Honorary Research Fellow.

Dr Malgorzata D'Aughton was employed by the UCD Mícheál Ó Cléirigh Institute in 2004 to compile an exhaustive catalogue of material artefacts especially chalices and other liturgical plates relating to the Irish Franciscans. Her mission was to identify, photograph and catalogue extant materials dating from before 1829. Based on Dr D'Aughton's survey the Institute applied for funding of €220,000 from the IRCHSS to build on the rich outcome of her work. In December 2005 the Institute received that funding for a two year programme to identify, catalogue and photograph material relating to all of the orders of friars and mendicant nuns in Ireland. Dr D'Aughton and Dr Colmán Ó Clabaigh OSB are working with Dr John McCafferty (UCD) and Raghnall Ó Floinn Keeper of Irish Antiquities, National Museum of Ireland on this exciting project. Preliminary results

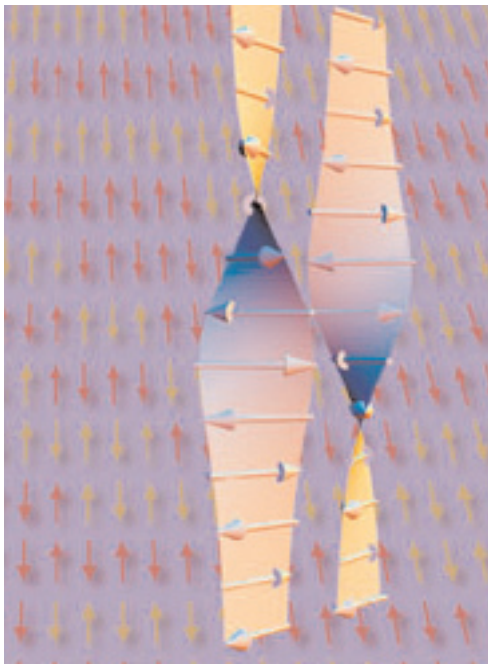
indicate sophisticated and distinctive Irish metalworking workshops which were supported by wealthy Catholic patrons in the first half of the seventeenth century. Projected outcomes include a searchable database, publications and conferences which will be considerable additions to the growing interest in the visual culture of medieval and early modern Ireland.

Professor James Heckman, University of Chicago and winner of the Nobel Prize for Economics (2000) took up his appointment as UCD Professor of Science and Society in June 2006. Professor Heckman has taken a very strong interest in the economic benefits of investment in early child wellbeing and his work shows that the early childhood environment has a direct influence on the subsequent economic success of that child into adulthood. Professor Heckman's work provides compelling, rigorous and quantifiable evidence for policy development and his appointment enables the coalescence of research taking place in the UCD Geary and UCD Conway Institutes. It is an exciting development for UCD that places scientific research in the context of today's society.

Dr Gareth Dyke, UCD School of Biology and Environmental Science, is leading an international consortium of researchers along with an international research team in the deployment of lasers over a remote area of Kazakhstan to significantly extend the search for dinosaur fossils. The research involves a collaboration between experts in Kazakhstan and Ireland and utilises technology developed by Intune Technologies, an Irish technology company established by a group of UCD engineering postgraduates. The project harnesses advanced laser technology and image analysis to survey rocks 90 million years old with the hope of uncovering new species of dinosaur. Dr Dyke has been conducting fieldwork in Kazakhstan for the past four years and has previously found a small well-preserved new species of dinosaur.

Dr Kevin O'Connor and his research team from the UCD School of Biomolecular and Biomedical Science, and the Centre for Synthesis and Chemical Biology (CSCB) have transformed non-environmentally friendly polystyrene foam into reusable, biodegradable plastic. A paper published in the American Chemical Society Journal *Environmental Science and Technology* describes how a combination of chemistry and microbes can facilitate the transformation. A technique called pyrolysis is employed which uses heat in a vacuum to break down the plastic into crude pyrolysis oil. The oil is then fed to a bacterium and these tiny microbes transform it into a biodegradable heat-resistant plastic that can be used in a variety of forms ranging from plastic bottles to surgical parts. The conversion of polystyrene to a biodegradable plastic is doubly beneficial to the environment as it reduces refuse and produces a plastic that can be added to the compost heap, thereby assisting the carbon cycle. Dr O'Connor's team is currently concentrating on increasing the yield of the PHA plastic.

Dr Gareth Dyke and Dmitry Malakahov, Geological Institute of Kazakhstan, excavating the fossil of a newly discovered species of theropod dinosaur. The fossil is being studied further in Dublin before being returned to Kazakhstan



Dr Hans-Benjamin Braun published a paper in Nature Physics on quantum fluctuations leading to the emergence of chirality in spin matter

Dr Hans-Benjamin Braun, UCD School of Physics, and his research team published an article in *Nature Physics* based on the findings that handedness or 'chirality' is an emergent property of quantum matter. The question how such handedness emerges in matter has been fascinating scientists since Pasteur's discovery of chiral molecules. An editorial accompanied the article outlining the significance of the research results, which were described by the Journal as being 'of great importance'. Dr Braun and his research team have identified a system that demonstrates the emergence of chirality in a quantum magnet. In an effort combining both theory and neutron scattering experiments at the world's most powerful neutron source in Grenoble (France), the researchers identified a model system that allowed them to obtain direct experimental evidence of how chirality emerges in a disordered quantum magnet. The results shed new light on enigmatic systems of complex quantum matter such as high transition temperature superconductors and have implications for the development of quantum computing and spintronics.

Professor Mary Daly, College Principal in the UCD College of Arts and Celtic Studies, with Dr Catherine Cox in the UCD School of History and Archives, received a Wellcome Trust Strategic Enhancement Award worth €400,000 to undertake a study on the history of medicine in Ireland. The award will allow the further development of medical history in Ireland as an established discipline and increase its profile as a research topic. The study will be conducted in partnership with Professor Greta Jones at the University of Ulster which will ensure that the research has an all-Ireland and cross-border dimension. Initial research will concentrate on the nineteenth and twentieth centuries, focused on medical practices and practitioners with allied projects on child health, birth control and maternal health. The research will examine the organisation and development of medical professions, the survival of alternative medical practices, the growth of medical specialities, and how health care was delivered from the eighteenth to the twentieth century. It will also examine the differences that existed north and south of the border, and the effect that general life and conditions in Ireland had on the development of medicine.

The *Applied Neurotherapeutics Research Group* (ANRG) at the UCD Conway Institute won first place for Best Partnership Alliance with Wyeth Research at the International Scrip Awards, for their co-operative work on brain illness treatments. The ANRG research cluster, which is funded jointly by SFI and Wyeth Research to the tune of €10 million, forms a unique, world-class team of scientists focused on building a research and development initiative to provide a new generation of drugs to be used in the treatment of brain disease. This interdisciplinary group of scientists is coordinated by Professor Ciaran Regan and is supported by Wyeth Discovery. This unique academic-industry interface significantly contributes to Ireland's growing reputation as a science-based society and prime biotechnology investment region.

FOURTH LEVEL

UCD has the greatest number of postgraduate students of any university in Ireland. In 2005/06, the postgraduate student population was over 20% of the overall student population. Separate to taught postgraduate programmes, the PhD and research Masters programmes make up a very significant proportion of the postgraduate population (32%).

UCD's Strategic Plan envisages that the university should be a national and European leader in postgraduate education. Realising this goal is key to the further development of UCD as a research-intensive university, to the vibrancy of our academic community and to the success of Ireland as a knowledge society.

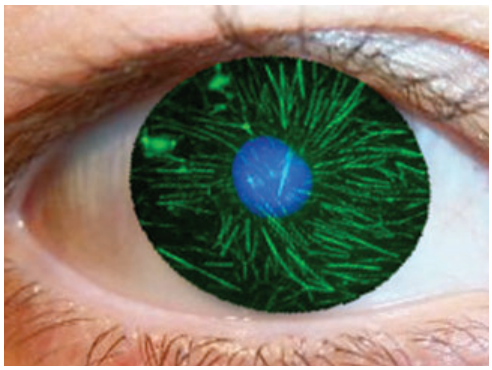
PROGRESS TO DATE

2005/06 has seen major developments in fourth-level (postgraduate) education at UCD. The Office of Postgraduate Studies was reorganised under the leadership of the Dean of Doctoral Studies and Postdoctoral Training - Professor Michael P Ryan. Five new Heads of Graduate School were appointed. These were:

- UCD Graduate School of Arts & Celtic Studies - Professor Gabriel Cooney;
- UCD Graduate School of Business & Law - Professor John Geary (Director of Doctoral Studies);
- UCD Graduate School of Engineering, Mathematical & Physical Sciences - Professor Julie Berndsen;
- UCD Graduate School of Human Sciences - Professor Ben Tonra;
- UCD Graduate School of Life Sciences - Professor Alan Baird.

During the year, detailed planning and design for graduate education in UCD was undertaken. Arising from this, new governance structures and PhD regulations were developed and approved by the Academic Council.

The introduction of the five new dynamic UCD Graduate Schools marks the growth and development of fourth-level education at UCD. They are closely linked with UCD's Research Institutes and will foster collaborative programmes and arrangements with different sectors outside the university and with leading universities around the world. The key strategic objective of the UCD Graduate Schools is to establish the UCD research Masters and the PhD as premier research training programmes and to enhance the reputation of existing graduate and researcher training in UCD's Schools.



This Image of a retinal pericyte was taken by doctoral student John Browne, UCD School of Medicine & Medical Science and the UCD Conway Institute

The guiding principles underpinning the Graduate School vision involve a programmatic approach, rewards and incentives, interdisciplinarity, lifelong learning and strong external linkages that add value.

NOTABLE ACHIEVEMENTS

The UCD Ad Astra Research Scholarships were created to launch the Graduate Schools. The Scholarships attracted very high quality applications and over 100 Ad Astra Scholarships were awarded.

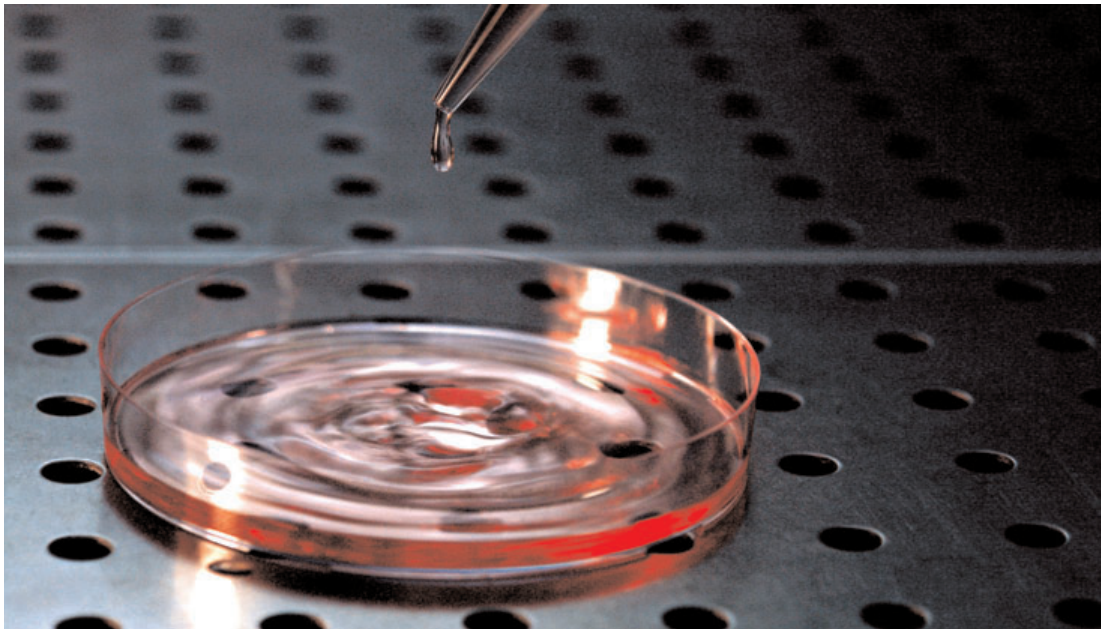
UCD PhD graduates and UCD postdoctoral fellows now have a favoured status with the University of Pennsylvania (UPenn) as it pilots a programme to recruit postdoctoral fellows from leading universities.

A major research university, UPenn currently has 800 postdoctoral fellows, 500 of whom are international. As the only Irish university in the UPenn programme, UCD is in the company of other leading international institutions including Oxford University, Leiden University and Tokyo University.

FUTURE OBJECTIVES

A major plan is being developed to internationalise, to a much greater extent, graduate education in UCD. Plans are in train to enhance scholarships for UCD-China exchanges. UCD also plans to establish graduate exchange programmes and develop joint PhD programmes with members of Universitas 21 and Groupe Maastricht. Arrangements are also being put in place to develop exchange graduate programmes with some leading universities in the US.

UCD RESEARCH INSTITUTES



Drop of Life: Image created by Xiaoxiao Chen, UCD School of Biomolecular and Biomedical Sciences for the UCD Images of Research Competition

The seven research institutes at UCD offer state-of-the-art facilities, technology platforms and a critical mass of researchers and academics.

Among them is the UCD Conway Institute, Ireland's leading biomedical research centre. Providing a patient-oriented platform for translational 'bench-to-bedside' medicine, the UCD Conway Institute has raised over €30m in peer-reviewed grant income in the past year.

The Centre for Synthesis and Chemical Biology is a collaboration in the chemical sciences between UCD, TCD and the RCSI. The UCD Geary Institute promotes excellence in the social sciences through frontier methods of investigation and close interaction with policymakers; in the past year it has raised over €2.2m in external research funding from major peer-reviewed sources and private philanthropy.

The Dublin Molecular Medicine Centre is a collaborative partnership in the biomedical sciences. The UCD Humanities Institute of Ireland is implementing a series of interdisciplinary research programmes. The UCD Urban Institute Ireland is a major European institute for the development of new technologies, policies and ideas designed to improve the quality of the working and living environment.

The UCD Mícheál Ó Cléirigh Institute continues the tradition of learning in Irish history established by the Irish Franciscans.

This image detailing an oak chair dated 1629 and used by Franciscan friars in Dublin's Adam and Eve's Tavern during Penal times was taken by Malgorzata D'Aughton as part of the UCD Mícheál Ó Cléirigh Institute digital archives

UCD CONWAY INSTITUTE OF BIOMOLECULAR AND BIOMEDICAL RESEARCH

The UCD Conway Institute currently has 138 Conway investigators. Together with their associated teams of approximately 320 postgraduate students and 150 postdoctoral fellows, they comprise a research community of some 600 people.

€30.2 million in peer-reviewed grant income was awarded to Conway investigators during the year in review. In terms of technology transfer, there were nine invention disclosures, four patent applications and one licensing agreement lodged by Conway investigators. Up to August 2006, 59 PhD and 23 Masters' thesis submissions were made by postgraduate students affiliated to Conway investigators.

Strategic objectives of the UCD Conway Institute are to:

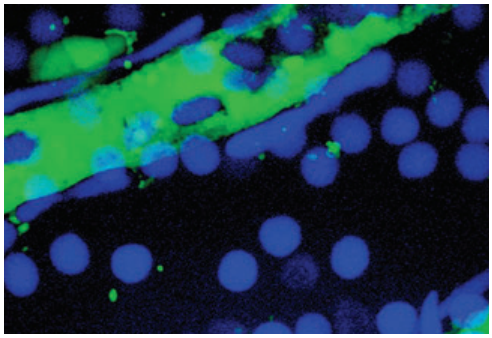
- Establish a world-class 'Centre of Excellence' in the biosciences at UCD within 10 years with success being measured by internationally accepted research outcomes;
- Provide effective governance, management and advisory structures to underpin scientific excellence, collaborative research, discipline integration, protection of intellectual property and fast-tracking of discoveries to bio-industry;
- Offer leadership in achieving the wider strategic objectives of the university in the areas of research, teaching and technology transfer in the life sciences;
- Achieve innovation through co-operation and partnership at local, national and international level with academic, healthcare and commercial partners.

PROGRESS TO DATE

In February 2006 the Centre for Synthesis and Chemical Biology (CSCB) building was formally opened by An Taoiseach, Bertie Ahern TD.

In March 2006, UCD Conway Institute Biotechnical Services was launched as a specific pathogen free (SPF) breeding, holding and research centre. The facility will be integral to the ability of the Institute to develop its own transgenic creation capability.

In April 2006, An Tánaiste, Mary Harney TD opened the UCD Genome Resource Unit at the Mater Misericordiae University Hospital.



This image of eye veins was created by UCD Conway doctoral student, Yolanda Alvarez and won third prize in the UCD Images of Research Competition

In a joint UCD Conway/UCD Geary initiative, Professor James Heckman, Nobel Laureate in Economics (2000) was appointed to the Chair of Science and Society. This appointment has seeded discussions between the two institutes to explore areas of collaboration such as health economics.

The Wyeth Research Ireland Laboratories were established with assistance from IDA Ireland. Dr Simon Hufton was appointed by Wyeth Laboratories to lead the initiative at the UCD Conway Institute. Ultimately, twelve scientists will be employed in the facility.

The UCD Conway Board was restructured and is chaired by Professor Des Fitzgerald, Vice-President for Research in UCD. The management team was replaced by two separate teams; an operational team comprising Professor Janet Allen, Director and members of the directorate staff and an executive team to manage academic issues as well as defining and implementing the strategic direction for UCD Conway Institute.

A series of internal research focus workshops was initiated to explore the relationship between traditional and non-traditional biological science disciplines anticipated to have a future research impact on biological sciences.

NOTABLE ACHIEVEMENTS INCLUDED:

- Professor Alan Keenan was awarded the Conway Medal by the Royal Academy of Medicine in Ireland;
- Professor Ciaran Regan, Dr William O'Connor and Dr Keith Murphy along with their colleagues in the

Pictured at the inaugural intervarsity science communications event Science Speak are Dr Austin Mescal, RDS President, Stephen Nolan, UCD Conway Institute, Winner 2006, Mary Upton TD and event host, Pat Kenny

Applied Neurotherapeutics Research Group (ANRG) received the prestigious International SCRIP Award for Best Partnership Alliance in December 2005, in recognition of the research partnership between academic and pharmaceutical industry partner, Wyeth Laboratories;

- Professor Therese Kinsella was elected to the Royal Irish Academy;
- Stephen Nolan, UCD School of Biomolecular and Biomedical Science and UCD Conway Institute took first place in *AccesScience '06* for his presentation on kidney disease: *When Good Cops go Bad*. Stephen represented UCD at the *RDS Irish Times Science Speak* - the inaugural intervarsity science communications event hosted by Irish Universities Promoting Science - and won the competition with his presentation;
- Aidan Farren, a 5th year pupil from Scoil Mhuire in Buncrana was overall winner in the *AccesScience '06* poster competition with his entry, *'DNA Professor'*. This was displayed on DART trains and in stations as part of the joint UCD Conway/Iarnród Éireann Science Track poster series;
- Conway investigators delivered a series of seminars as part of the UCD Conway *Science4Schools* outreach programme. Lectures such as *Cancer Uncovered* by Dr Amanda MacCann and *The Great Brain Drain - Science of Addiction* by Dr Jana Haase aim to complement the biology and chemistry secondary school syllabi;
- A week long structured programme of transition year work placements took place in January 2006 as part of *Science4Schools*. Over 65 applications were received and 15 students from 15 schools were selected;
- *ScienceWorks* included 180 transition year pupils from eight secondary schools across Dublin taking part in a four week long series of science workshops.

FUTURE OBJECTIVES

Postgraduate education

The UCD Conway postgraduate programme is in the process of being modularised and accredited as part of the new structured PhD programme.

Systems Biology

UCD Conway Institute is leading the approaches at UCD to find ways to integrate biological sciences with applied mathematics and computer science to develop the new area of Systems Biology.

Appointments

Dr Brendan Loftus formerly at TIGR, Maryland, USA has been recruited back to join the UCD Conway Institute in December 2006 and has been awarded a large Science Foundation Ireland (SFI) grant to examine host pathogen interactions using a cross-platform approach combining informatics, comparative functional genomics and proteomics.

Professor Mike Keane (UCLA) was appointed as Professor of Medicine at St Vincent's University Hospital and will take up his appointment in summer 2007. His research interests in pulmonary fibrosis match the strategic developments at UCD Conway Institute in experimental medicine in the area of inflammation and its resolution.

As part of IRCSET's Enterprise Partnership Scheme, Hewlett Packard Galway is funding 12 PhD scholarships to undertake research in the intersection between computational science, high-performance computing, healthcare and life-sciences across Ireland over the coming years. This will form the core of a multi-institutional fourth-level programme in biomedical informatics developed by HP and UCD in partnership with Trinity College Dublin and the National University of Ireland, Galway.

COLLABORATION TO ENHANCE DRUG DELIVERY

A SFI Industry Research Supplement grant was made in October 2005 to Professor Cormac Taylor to facilitate research in association with Sigmoid Biotechnologies to develop an enhanced drug delivery system. Dublin-based Sigmoid Biotechnologies is developing a novel drug delivery technology, LEDDS, which will improve the effectiveness, safety and convenience of existing drugs and enhance next-generation drug development. The collaboration has the potential to generate innovative and powerful drug delivery concepts, leading to improved patient care, while at the same time promoting industry and academic research collaboration.

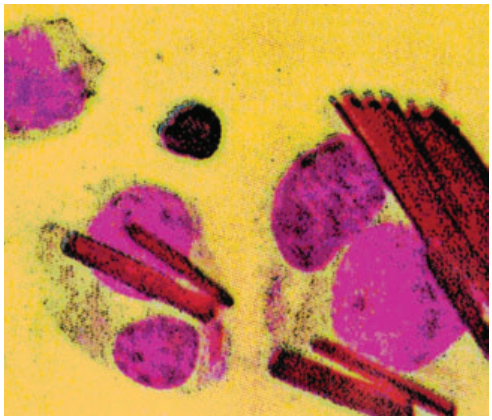
CENTRE FOR SYNTHESIS AND CHEMICAL BIOLOGY (CSCB)

The Centre for Synthesis and Chemical Biology (CSCB) is a collaboration in the chemical sciences between UCD, TCD and the RCSI. It has over 45 Principal Investigators and, along with their teams, comprises over 200 researchers. The UCD researchers (31 Principal Investigators) are from the Schools of Chemistry and Chemical Biology, Biomolecular and Biomedical Science, Physics, and Chemical and Bioprocess Engineering.

The mission of the Centre is to promote knowledge, health and economic advancement through excellence in the chemical sciences of synthesis and chemical biology, to enrich the nation's research and educational resource base and to facilitate the development of the pharmaceutical industry in Ireland.

The Centre has the following strategic objectives:

- Advancing knowledge in the chemical sciences of synthesis and chemical biology, as part of a collaborative biomedical research effort;
- Fuelling the Irish pharmaceutical industry, and attracting pharmaceutical research and development to Ireland;
- Raising the research profile of Ireland through international collaboration and increased high impact publications;
- Fostering entrepreneurship, supporting technology transfer and developing strong partnerships with industry;
- Providing new high quality research and teaching programmes for Irish students;
- Developing an informative outreach programme to enhance the public awareness and understanding of chemical sciences.



An Taoiseach, Bertie Ahern TD and Professor Pat Guiry, Director of the CSCB at the official opening of the UCD CSCB building

PROGRESS TO DATE

In 2005/06, CSCB researchers graduated over 50 PhD students, published over 100 articles in peer-reviewed journals, gave over 200 invited lectures and poster presentations and were awarded over €6m in external funding.

CSCB researchers work closely with NovaUCD to facilitate successful commercialisation of the research programmes. In November 2005 Celtic Catalysts, a company co-founded by Professor Declan Gilheany, was awarded a European Commission grant of almost €1 million under the Marie Curie scheme.

The CSCB launched a new website in March 2006, which provides profiles on all Principal Investigators as well as regular news and information on CSCB research and events (www.ucd.ie/cscb/).

The *Science@CSCB* outreach programme was launched in January 2006 and in this reporting period over 300 second-level students have taken part in outreach activities including half-day workshops, career talks and tours of the state-of-the-art laboratories at the CSCB building on the UCD campus.

The CSCB welcomed five new UCD Principal Investigators - Dr Paul Evans, Dr Cosima Stubenrauch, Dr Francesca Paradisi, Dr Hasim Ibrahim and Dr Xiangming Zhu. 12 PhD studentships, worth a total of €960,000 were awarded to UCD Principal Investigators in May 2006.

An image of crystals of Clofazimine (anti-leprosy drug) in cells created by CSCB researcher Raphael Darcy for the UCD Images of Research Competition

NOTABLE ACHIEVEMENTS

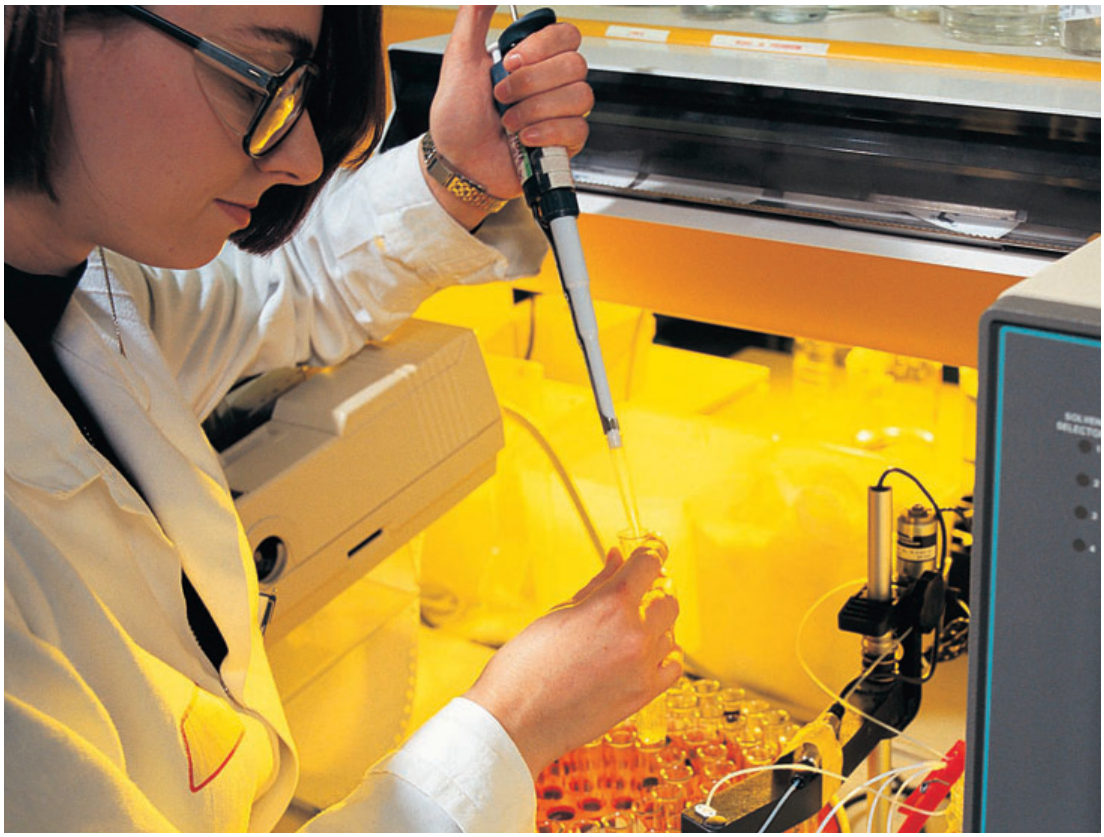
The new UCD CSCB building was opened by An Taoiseach in February 2006. It is a 2,300m^2 building comprising six state-of-the-art laboratories.

Over 200 researchers attended the 4th annual Advances in Synthesis and Chemical Biology symposium in UCD in December 2005. Plenary lectures were given by Professor Tadhg Begley (Cornell), Professor JoAnne Stubbs (MIT), Professor Linda Hsieh-Wilson (Caltech), Professor Volker Dötsch (MPI, Frankfurt-am-Main), Professor Amos B Smith (University of Pennsylvania) and Professor David MacMillan (Caltech).

FUTURE OBJECTIVES

The CSCB will continue to strive towards the strategic research and teaching and learning objectives as outlined at its inception by aiming to:

- Strengthen the links between UCD, TCD and the RCSI by encouraging collaborative research between researchers across these institutions;
- Increase the number of PhD students and further enhance the research effort through the hiring of more postdoctoral fellows and visits of internationally recognised scientists to the CSCB;
- Actively source funds to support the research effort;
- Increase the quality and quantity of peer-reviewed publications and the number of invited lectures given by CSCB researchers;
- Update existing modules and devise new modules for both undergraduate and postgraduate training;
- Complete the design of the new BSc degree in Chemical Biology which commenced with its first entry of students in September 2006;
- Expand the reach of the *Science@CSCB* outreach programme.



DUBLIN MOLECULAR MEDICINE CENTRE

The Dublin Molecular Medicine Centre (DMMC) exemplifies UCD's commitment to collaborative partnerships in the biomedical sciences. This joint venture between UCD, TCD and RCSI is helping to position Dublin as a centre of excellence in molecular medicine research and education.

(Left to right) Dr Peter Doran, Director of the GRU, Tánaiste and Minister for Health, Mary Harney, TD, Dr Hugh Brady, President of UCD and Prof Bill Powderly, Head of UCD School of Medicine and Science at the opening of the GRU in the Mater Hospital

DMMC has helped align the activities of Dublin's biomedical research institutions and six affiliated teaching hospitals under a common framework designed to facilitate cross-institutional collaboration and enhance translational research capability.

PROGRESS TO DATE

The current €45 million Programme for Human Genomics has funded developments of platform technologies in proteomics, functional genomics, genetic epidemiology, bioinformatics, advanced high throughput cell analysis and imaging which are distributed across Dublin and accessible to all. Key infrastructure envisaged in the DMMC plan for the development of translational medicine has now been put in place in the form of Clinical Research Units at the teaching hospitals, linked to the research institutes: the UCD Conway Institute, the TCD Institute of Molecular Medicine and the RCSI Research Institute.

The pool of academic talent has expanded with the recruitment of key research staff and has been enhanced by the continued success of the DMMC Education and Training Programme. The DMMC Scientific Advisory Council has strongly recommended that to become a truly international player, the next phase of DMMC's strategic development should be to become a national entity.

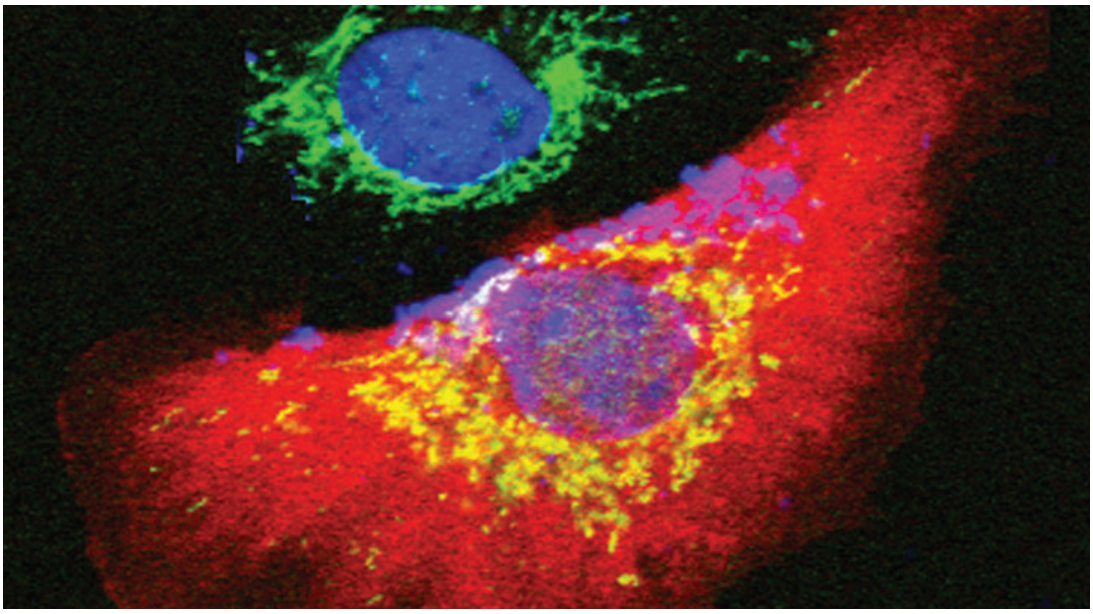
Major milestones this year saw the opening of Genome Resource Units (GRUs) on the St Vincent's University Hospital and the Mater Misericordiae University Hospital sites. While significantly adding to UCD's research infrastructure, these units will also be core pillars of the Wellcome Trust / Health Research Board funded Dublin Centre for Clinical Research (DCCR). This new funding, won through a collaborative grant application in the face of strong competition in Ireland and the UK, will build a new Clinical Research Centre (CRC) at St James's Hospital together with a cross-institutional infrastructure for sample and data management. This network will link the new CRC at St James's with the CRC at Beaumont Hospital and UCD's two Genome Resource Units. Disease-specific bio-collections are ongoing within all these facilities: in psychoses (funded by the Wellcome Trust), epilepsy, autism, inflammatory bowel disease, rheumatoid arthritis, cardiovascular diseases, and various cancers including prostate (funded by the Irish Cancer Society), breast, oesophageal and haematological. These bio-collections are the cornerstone of translational research programmes, providing many scientists with well-managed access while promoting best practice in sample collection and storage together with informatics expertise and skilled specialist staff.

Building on this new physical infrastructure, the move towards creating a harmonised and coordinated clinical research infrastructure in Ireland has seen the creation of ICRIN (Irish Clinical Research Infrastructure Network) as a first step. ICRIN links National University of Ireland Galway (NUIG) and University College Cork (UCC) and their affiliated teaching hospitals with the DMMC to create a network capable of conducting nationwide clinical studies in all disease areas. A memorandum of understanding to create ICRIN was signed in July 2006.

FUTURE OBJECTIVES

The natural extension of recent infrastructural developments is to create a world-class environment in translational biomedical research at the heart of the Irish healthcare system. Future efforts led in part by DMMC will focus on:

- Translation of new knowledge into tangible clinical benefit to raise standards of healthcare;
- Raising standards for the individual through specialised and focused healthcare via treatment in a clinical research-intensive environment;
- Attracting the best clinician scientists and, with mentoring and new education and training programmes, drive an increase in skill levels in translational medicine;
- Encouraging industry (pharma, biotech, diagnostic, medical devices and clinical research organisations) to partner with academic translational research groups to develop diagnostic and prognostic biomarkers and new therapeutic intervention strategies.



This image of kidney cells was created by doctoral student Madeline Murphy in the course of her research into diabetic kidney disease. The image was submitted to the UCD Images of Research Competition

DMMC EDUCATION AND TRAINING

DMMC Education and Training builds on the research and teaching strengths of UCD, TCD and RCSI and the clinical expertise in the Dublin teaching hospitals to deliver an easily accessible means for researchers in multiple institutions to develop their skills and broaden their training in the biosciences, with a major emphasis on translational research. DMMC courses, both lecture-based and practical, are delivered by instructors from multiple institutions. This year saw 677 participants of all levels attend 10 DMMC courses ranging from introductory to specialised and from technology-oriented to disease-focused.

New features this year included the opening of selected courses to an international audience, the inclusion of keynote lecturers from outside Ireland and the utilisation of sponsorship from relevant companies. The first course to incorporate these elements was Unravelling Chromatin and the Role of Epigenetics in Disease *which ran in April 2006 and included participation from across Ireland, Europe and the US. A DMMC/Wyeth Pharmaceuticals collaboration,* Molecules to Medicines: How Biopharma Delivers, *comprised a one day overview of the science going from biopharmaceutical drug discovery to commercialisation, followed by a one day workshop for postgraduate students probing key issues arising during biopharmaceutical research, development, and manufacturing. Another new DMMC course,* Population Genetics and SNP Analysis, *introduced researchers to key strategic considerations in designing and performing gene-mapping studies using SNP markers and provided 'hands-on' experience of data analysis through a practical workshop.*

UCD GEARY INSTITUTE

The mission of the UCD Geary Institute is to be a leading centre for quantitative and analytical research and to provide evidence to policy makers of effective solutions to economic, political and social questions.

UCD Geary Institute

The Institute vision is to:

- Support frontier methods of investigation, leading to the very best in research publication;
- Enhance the international profile and ranking of its researchers;
- Play a central role in the training of the next generation of researchers by maximising opportunities for graduate students to work alongside senior researchers on live projects;
- Provide objective analysis and effective solutions that address the challenges facing policy makers.

PROGRESS TO DATE

In the period 2005/06, over €2.2m was raised in external research funding from major peer-reviewed sources and private philanthropy.

New cross-disciplinary collaborations have already taken place within UCD, most notably with the UCD School of Public Health and Population Science and the UCD Conway Institute. Exciting new research strands in areas such as food risk communication, behavioural economics, health risk behaviour and evaluation methodology have developed alongside ongoing work in political participation and labour markets.

2005/06 saw the appointment of Nobel Laureate in Economics Professor James Heckman as the UCD Conway Institute/UCD Geary Institute Professor of Science and Society, as part of a major investment in *Human Development and Public Policy* by the PRTLI and Atlantic Philanthropies.

Professor James Bergin took up an appointment with the UCD School of Economics and is developing his research programme on theoretical models of innovation and its interface with commercial law and health economics.

FUTURE OBJECTIVES

UCD Geary Institute will build on its key appointments and funding successes through the following activities:

- Greater engagement with policy makers, providing research evidence to inform major policy questions and raise public profile;
- Further national and international collaboration and strengthening of existing ties with the RAND Corporation, Kennedy School of Government at Harvard and University of Chicago Harris School of Public Policy amongst others;
- Pursuit of new funding opportunities including Science Foundation Ireland, FP7 and the European Research Council, and the nurturing of new research funding partnerships with the public and private sectors;
- Graduate student involvement in research clusters will be further strengthened through the enhancement of the seminars and masterclass series introduced in 2004. The alliance with the Harris School of Public Policy at the University of Chicago will provide additional expertise to the programme and plans are in development for the establishment of professional development programmes in public policy aimed at policy professionals.

UCD Geary Institute staff and visitors with Professor James Heckman and Professor Colm Harmon, Institute Director (front centre)

THE CENTRE FOR ADULT DECISION MAKING

The Centre for Adult Decision Making, led by Professor Colm Harmon and Professor Patrick Wall, is developing as a major centre within the UCD Geary Institute and conducts work in the following areas:

- *Risk Perception, Food and Nutrition;*
- *Health Risk Behaviours such as alcohol consumption and smoking;*
- *Student Health and Welfare;*
- *Ageing (including the Survey of Health, Ageing and Retirement);*
- *Advanced Survey Methodology and Measurement;*
- *Experimental Design, Neuroscience and Choice.*

The Centre collaborates intensively with colleagues at the RAND Corporation in the USA and other institutions. The research team, led by Senior Researcher Dr Liam Delaney, has secured a sustained and significant funding stream in excess of €3m, from a range of sources including Diageo Ireland PLC, the Strategic Innovation Fund, the FIRM initiative of the Department of Agriculture and Food, the HEA and IRCHSS. It will launch a number of major studies throughout the next year.

UCD HUMANITIES INSTITUTE OF IRELAND

UCD HII's research programme makes up an integral part of UCD's strategic mission to become a leading international research-intensive university. The HII's broad strategic objectives centre on supporting innovation and excellence in research in the humanities, while concurrently providing a platform for high quality doctoral students and post-doctoral fellows.

The HII's current research programme is funded through the HEA's PRTLI 3 and is entitled *Identity, Memory and Meaning in the 21st Century*. The HII works to create a dynamic cross-disciplinary and integrative research environment for humanities researchers at UCD.

In the areas of teaching and learning, the HII is committed to transforming postgraduate training by creating programmes that promote inter-disciplinary learning and transferable skills. The HII's Irish Virtual Research Library and Archive (IVRLA) is maximising the potential offered by digital technology to make UCD's archival and library resources available to students and scholars in Ireland as well as worldwide.

PROGRESS TO DATE

During the period covered by this report, 20 doctoral students, five postdoctoral fellows and six project researchers were attached to UCD HII. In addition to the Institute Director and Institute Manager, there are six principal researchers from the UCD College of Arts and Celtic Studies leading research strands within the HII's current programme.

The HII has pioneered the concept of a dedicated interactive research space for the humanities at national level. The HII has placed special emphasis on the provision of a supportive environment for early stage researchers. In particular, it has emerged as an exciting academic and social space for postgraduate researchers in the arts and humanities. The HII is also committed to building greater national capacity in the humanities through links with other institutions, including its PRTLI-funded research links with St Patrick's College, Drumcondra. In the area of international co-operation, the HII is an active member of the Consortium for Research Institutes in the Humanities.

Through the Irish Virtual Research Library Archive (IVRLA), the HII is exploring the boundaries of leading-edge research facilitated and enhanced by humanities computing. The development of electronic research resources is still at an early stage, however, the IVRLA places the HII to the forefront of developments in this area nationally and internationally.

Dr Marc Caball became the new Director of the HII in December 2005.

HII researchers, at both academic and doctoral levels, published research material across a diverse range of national and international peer-reviewed publications.

In line with its commitment to enhancing graduate training in UCD, the HII continued to offer its highly popular inter-disciplinary doctoral training programme to research students.

The HII inter-disciplinary seminar series developed further as a focal point for academic and intellectual discussion among humanities and human sciences scholars at UCD and beyond. Among the scholars who delivered papers were Dr Ann Rigney, Professor of Comparative Literature at the University of Utrecht and Professor Andrew Fleming, Department of Archaeology at the University of Wales in Lampeter.

Professor Wolfgang Iser (University of Konstanz), the world-renowned literary theorist, delivered a HII Distinguished Guest Lecture in March 2006 and Professor of Cognitive Sciences, Merlin W. Donald, Case Western Reserve University, delivered a HII Distinguished Guest Lecture in May 2006.

In co-operation with the Research Institute for History and Culture (OGC) at the University of Utrecht, the HII concluded an exchange programme agreement for doctoral students within the framework of the EU Socrates scheme.

FUTURE OBJECTIVES

The HII's future research focus will be on changing images of Ireland. Such a programme will further develop UCD's extensive strengths in Irish Studies across the disciplines and will leverage extensive research networks that have been established in Ireland and globally. It will also complement recent strategic appointments at UCD such as the Professorship of James Joyce Studies as well as lectureships in environmental archaeology, media history and history of medicine.

UCD URBAN INSTITUTE IRELAND

UCD Urban Institute Ireland (UII) is the national centre and a major European institute for the development of new technologies, policies and ideas designed to improve the quality of the working and living environment.

The initial concept for UCD Urban Institute Ireland to be a centre for research on sustainable urban development has evolved over the past four years and the Institute now carries out research on a broader range of topics that encompass rural as well as urban development.

The Institute brings together a unique mix of researchers spanning scientific, technical, professional, and public policy disciplines that include engineering, planning, environmental policy, geography, architecture, economics, sociology, physics, rural development, transport policy, biology and climatology. This provides a synergy to tackle the multi-dimensional challenges of achieving sustainable development in new and innovative ways. The integration of architecture, planning, civil engineering and the wide range of other disciplines that UCD provides is unique in Ireland.

PROGRESS TO DATE

There continues to be significant growth in the quality and quantity of research outputs at UCD Urban Institute Ireland. There are currently eight postdoctoral researchers and 90 PhD and research Masters students. These numbers have grown, particularly in the past year, and growth is set to continue. Research and other Institute income, from a wide range of sources, has reached €3 million per annum and publications average about 100 per year.

UCD Urban Institute Ireland has very strong links within Ireland and internationally, including the Environmental Institute in UI Chicago, the Forum of European National Highway Research Laboratories, The Environmental Economics Unit, Göteborg University, the Centre for Energy and Environmental Research, MIT and more. The Institute is also in the process of signing a collaboration agreement with the Joint Research Centre (JRC) of the European Commission at Ispra, Italy.

The UII Urban Environment Project is a €1.2 million initiative funded by the Environmental Protection Agency. Three UCD Schools in three Colleges are partnering with the JRC, NUI Maynooth and Trinity College Dublin to understand how change in economy, infrastructure and land use interact and influence environmental performance, including climate change, biodiversity and air quality. The project aims to deliver a decision-aiding tool for those in the national and local policy process and a source of information for the general public about policy choices and implications.

Prof Frank Convery, Project Director, UCD Urban Institute Ireland, Sheila Convery, Project Manager, UCD Urban Institute Ireland with Larry Stapleton, Director, EPA, at the launch of the Urban Environment Project

FUTURE OBJECTIVES

In the coming year, UCD Urban Institute Ireland will expand its focus beyond urban issues to encompass a wider range of sustainable development research. This will include topics such as rural development, sustainable energy and global warming.

Substantial growth is expected in geographical information science research, which underpins Geographical Information Systems (GIS). A range of facilities to leverage existing GIS research activity in such diverse fields as planning, agriculture, psychology and education is being proposed and there will be a new focus on quality of life and life satisfaction issues. Environmental factors influencing life satisfaction will be integrated in a GIS database and monitored over a decade.

UCD Urban Institute Ireland members have participated in Fourth, Fifth and Sixth European Framework projects. This will be expanded as the European Commission launches its Seventh Framework where the Institute is planning to lead a major European project on freight transport, a significant challenge for the future sustainable development of the continent.

FOURTH LEVEL

There are now six Masters degree programmes, making UCD a world leader in the provision of Masters programmes in Planning. Considerable progress has been made in the planned integration of these Masters programmes with the emerging concept of PhD programmes. It is anticipated that the UII will have three structured PhD programmes in place by September 2007, under the overarching theme of sustainable development.

UCD MÍCHEÁL Ó CLÉIRIGH INSTITUTE

The mission of the Institute is to continue the tradition of learning in Irish history and civilisation established by the Irish Franciscans in the seventeenth century; to conserve the legacy of manuscripts and books entrusted to UCD by the Irish Franciscans; to make the collection available as a research tool for scholars of Irish studies; to act as an educational resource for scholars in Ireland and abroad; to encourage an appreciation of the country's rich inheritance from the past in modern Ireland.

PROGRESS TO DATE

During 2005/06 conservation of Ms A2, the Liber Hymnorum was completed. This is an extremely complex manuscript composed of three separate quires. Besides extensive work on the vellum itself, to hydrate the skin and then address structural damage, an appropriate binding was developed and a conservation grade housing constructed. The scale and complexity of the work is reflected in the two years spent on conservation. A2 is available online, along with most of the other early manuscripts, as a high quality publicly accessible digital image.

The Institute received a gift of €500,000 from a private donor. In December 2005 the Institute receved funding of €220,000 from the IRCHSS for a two year programme to identify, catalogue and photograph material relating to all the orders of friars and mendicant nuns in Ireland.

Three international conferences took place during the year. The Institute also ran over 30 seminars and its team of 10 postdoctoral and PhD researchers was responsible for over 40 scholarly publications ranging from monographs to journal articles.

In July 2006 the collection of manuscripts catalogued as the Franciscan Library Killiney B and D manuscripts were transferred to UCD. These large collections consisting of over 300 volumes and in excess of 10,000 pages reflect the varied and important activities of the Irish Franciscans in the 16th, 17th and 18th centuries.

The B manuscripts are in different languages and date back as early as the 12th century.

The D manuscripts consist of a highly significant collection of letters and papers associated with the Irish Franciscans of the 17th century, in particular Luke Wadding. This important national archive contains the correspondence of some of the most eminent figures in 17th century Irish history, among them Hugh O'Neill, Earl of Tyrone, St Oliver Plunkett, Archbishop of Armagh and Florence Conry (Flaithrí Ó Maoil Chonaire), founder of the Irish Franciscan College of St Anthony in Louvain, Belgium.

FUTURE OBJECTIVES

The Institute is the national coordinator for a series of public events, academic conferences, exhibitions and publications during 2007 to celebrate the 400th anniversary of the foundation of St Anthony's College, Louvain. This presents a major opportunity to fulfil the public education remit of the Institute. The theme of the year's programme is *The writing of Irish history*.

As well as advertising postdoctoral and doctoral fellowships to mark the anniversary year a musical suite has been commissioned and will be premiered in the Royal Hospital Kilmainham in March 2007. The inaugural UCD-Irish Institute Louvain summer school will be held in May of 2007 with contributions from leading scholars of early modern Ireland and of Gaelic literature. There will be exhibitions in the National Museum of Ireland, the National Library of Ireland, Waterford City Museum and the Hunt Museum, Limerick. A joint venture between the Ó Cléirigh Institute, Royal Irish Academy and Trinity College Library will see key related manuscripts such as the Annals of the Four Masters exhibited together for the first time in almost four centuries.

The anniversary year will be accompanied by popular and academic publications and a special series of conferences in UCD and across the Irish third level sector.

A conservator restoring a Franciscan manuscript

NOVAUCD – THE INNOVATION AND TECHNOLOGY TRANSFER CENTRE

NovaUCD is an exciting Innovation and Technology Transfer Centre based in UCD's Belfield Innovation Park. This purpose-built centre offers a supportive environment and incubation facilities to assist innovators and entrepreneurs in taking their ideas from proof-of-principle to full commercial success.

A major strategic objective for UCD is to contribute to the social, economic and cultural objectives of a knowledge society. In this regard, key actions identified in UCD's Strategic Plan 2005-2008 for NovaUCD include:

- Initiation of a knowledge management programme;
- Identification and protection of UCD's intellectual property;
- Commercialisation of UCD's intellectual property through licensing and spin-off companies;
- Training of UCD staff in knowledge transfer and entrepreneurship through integration of NITM (National Institute of Technology Management) and NovaUCD;
- Developing corporate partnerships with business and industry to support and enhance research activities.

The activities of NovaUCD are overseen by a board chaired by Paul McCambridge, Vice-President and Managing Director of Xilinx, which includes senior representatives of UCD, NovaUCD sponsors, industry and research funding agencies.

PROGRESS TO DATE

The level of invention disclosures by UCD researchers in the last year has increased to 29 from 22 in the previous year. This is indicative of a considerable increase in the level of potential intellectual property generated across the university from its research programmes. In the last year UCD filed 13 priority patent applications across all areas of life sciences, engineering and information and communication technology. In addition five PCT patent applications and four national/regional patent applications were filed. During 2005/06, six licence agreements were signed with a range of indigenous and international companies.

Prof Conor Heneghan, UCD School of Electrical, Electronic and Mechanical Engineering, winner of the NovaUCD 2006 Innovation Award

Twenty-six knowledge-intensive companies, occupying over 95% of NovaUCD's available incubation space, and employing over 150 people, are now located in NovaUCD. In keeping with NovaUCD's strategy of continuously refreshing its community of entrepreneurs, four of NovaUCD's client companies will shortly 'graduate' to make way for new ventures.

NovaUCD is responsible for the implementation of UCD's intellectual property policy and for supporting the development of a strong intellectual property pipeline. All 2005/06 targets for identification, protection and commercialisation of UCD intellectual property, mainly through licensing to new and established companies, were achieved. In addition, the UCD Governing Authority has formally approved a new intellectual property policy which was developed in accordance with international best practice and incorporates the main provisions of the previous policy adopted in 1992.

This new policy takes into account changes in legislation and also provides for a significant increase in the level of commercial income distributed to researchers and other generators of intellectual property.

Almost 340 m^2 of wet laboratory space, which can accommodate four to six biotechnology companies, has been developed at NovaUCD and is currently occupied by two new ventures.

Now in its eleventh year, NovaUCD's annual Campus Company Development Programme provides support for the promoters of 12 high-tech potential start-ups in taking innovative ideas from proof-of-concept to fully developed, commercially sound business enterprises. The 2005 Campus Company Development Programme award was made to Vocal Health Screen, founded by Rosalyn Moran, a PhD student in the UCD School of Electrical, Electronic and Mechanical Engineering.

During the year, ChangingWorlds, winner of the DHL Exporter of the Year 2005 Award and co-founded by Professor Barry Smyth, Head of the UCD School of Computer Science and Informatics, expanded its Advanced Research Centre in NovaUCD. At NovaUCD, the company has a team of 17 highly qualified software engineers who are working together with UCD researchers in developing advanced personalisation technologies for the mobile telecommunications industry. Professor Smyth was a finalist in the *Ernst and Young Entrepreneur of the Year 2006 Award*.

Wet laboratory at NovaUCD

FUTURE OBJECTIVES

NovaUCD's vision is to become an international leader in the commercialisation of research and other knowledge-intensive activity for the benefit of the economy and society. NovaUCD has developed an ambitious five-year plan to increase the early identification and protection of research generated intellectual property and to maximise its commercialisation. The key priorities for NovaUCD include:

- Technology Transfer and Commercialisation - Develop the Technology Transfer and Commercialisation team to focus on the priority research areas of the university;
- Business Development - Establish a business development unit to identify and develop market led opportunities for commercialisation and collaboration;
- Industry Partnerships - Develop Belfield Innovation Park to attract industry partners onto the campus and strengthen the management of industry partnerships;
- Campus Companies - Further expand the NovaUCD Campus Company Development Programme to provide training, advice and facilities for campus companies, with increased emphasis on UCD spin-offs;
- Awareness and Training - Increase access to awareness and training for researchers, PhD students and technology transfer professionals and develop a culture of innovation and entrepreneurship.

BIANCAMED

BiancaMed, whose target market is the fast-growing home-health sector, was founded in 2002 by Dr Philip de Chazal, Dr Conor Hanley and Professor Conor Heneghan as a spin-off from the UCD School of Electrical, Electronic and Mechanical Engineering. In June the NovaUCD 2006 Innovation Award was presented to Professor Heneghan, already a named inventor on four UCD patent applications, in recognition of his success in the commercialisation of research undertaken at UCD.

Currently based in NovaUCD, BiancaMed's vision is to provide convenient health and wellness monitoring technology for use in daily life. BiancaMed currently employs a staff of five, has raised $400,000 in funding and has secured deals with leading US companies, Del Mar Reynolds Medical and ResMed. In 2005 BiancaMed's screening technology, which it had licenced to Del Mar Reynolds Medical to develop the LifeScreen Apnea™ product, secured Food and Drug Administration (FDA) clearance enabling this medical device to be marketed in the United States. LifeScreen Apnea™ permits cardiologists to screen for obstructive sleep apnea, a medical condition in which the breathing of an individual is interrupted while he/she is asleep. BiancaMed is currently developing a product which will allow ultra-convenient heart and respiration monitoring at home as part of an overall health management suite.