



Professor Orla Hardiman, **Academic Director** Mr Tony Byrne, **Executive and Technical Director**

Welcome to the 9th Newsletter from TBSI. Here, we present the latest research, collaborations, discoveries, grants & awards, events and research activities from 2017



There is one word that sums up the year at TBSI and that is Excellence. The Institute, comprising over 500 researchers including over 100 PIs, is a powerhouse of scientific discovery across a wide range of disciplines under the broad umbrellas of the schools of Biochemistry and Immunology, Chemistry, Pharmacy, Bioengineering and Medicine. In this newsletter, we have collated the scientific highlights of the year in research, publications, new industry collaborations, competitive grants, measures of esteem and public outreach.

In 2017, TBSI researchers were successful in securing 5 national, 3 major European grant awards and several prizes for engagement at scientific meetings, some of which include; National Funding Awards; Health Research Board – HRB Emerging Investigator: Dr. Peter Bede (€800,000), Dr. Mark Robinson (€800,000); Science Foundation Ireland Investigators Programme – Prof. Martin Caffrey (€2,019,877), Prof. Andrew Bowie (€1,947,730) and Prof. Kingston Mills (€1,996,376); SFI-HRB-Wellcome Investigator Award – Dr. Rachel McLoughlin (€1,799,217). European Grants; H2020 Marie Skłodowska-Curie Innovation Training Network- Prof. Lorraine O’Driscoll (€3.9m); ERC Consolidator Grant – Dr. David Finlay (€2m); ERC Proof of Concept – Dr. Daniel Kelly (€150,000). Prizes & Awards; LERU citizen science competition award - Shauna Quinn; TCD- Thesis in 3 - Nicole Campbell; SFI Science Summit Awards 2017 - Dr Rachel McLoughlin; Trinity Provost Innovation Award – Prof. Luke O’Neill; IRC ‘Thomas Mitchell Medal of Excellence’ - Dr Natalia Muñoz-Wolf; Irish Thoracic Society Best Oral Presentation - Lucy Bergin; Immunometabolism Conference 2017, Best Poster– Sarah Corcoran.

As we move forward to 2018, it is clear that TBSI researchers are well positioned to drive exciting and innovative scientific discoveries that are recognised, acknowledged and celebrated across the world.

RESEARCH (To read more go to [recent discoveries](#) or to www.tcd.ie/biosciences)



Breakthrough by Trinity Scientists Could Lead to New Treatments for Asthma and Eczema

The Trinity team, led by TBSI’s Prof **Padraic Fallon** (pictured here) of the School of Medicine, discovered that this inflammatory response was governed by a “checkpoint” controlled by a certain type of immune cell, called a “type 2 innate lymphoid cell”. This cell instructs another type of cell, called a Th2 cell, and the Th2 cell causes the inflammation. In this study, the precise way the immune cell “tells” the Th2 cell to attack has been identified. This is



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significant and means it may be possible to find a way to turn it “off” when it misfires. Media: [Journal of experimental Medicine](#), [TCD press](#) and [University Times](#)



Don't Shoot the Messenger Research led by TBSI's Professor **Lorraine O'Driscoll** (School of Pharmacy & Pharmaceutical Sciences) made a discovery around treatment-resistant breast cancer that may turn the phrase, 'don't shoot the messenger', on its head. Lorraine O'Driscoll said: “This study sets the proof-of-principle basis for the development of a predictive tool for doctors, which would be able to tell from a blood sample whether the patient would respond to targeted treatment before it is given. This would help ensure that only those patients that would benefit from this type of treatment would be given it, while non-responders would not receive unnecessary treatment, and associated side-effects and would instead be given a different, likely more effective treatment to begin with.”

Media: [Journal Oncolmunology](#), [the University Times](#) and [Trinity Press](#)



Forgotten memories may be retrievable, 8 August 2017. Probably best explained by this YouTube [video](#)

Tomás Ryan, Assistant Professor in Trinity's School of Biochemistry and Immunology, pictured here.

Media: [Trinity Press](#) [about Tomás](#)

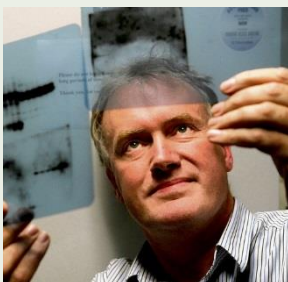
Collaboration

Institution: TRINITY COLLEGE DUBLIN

Proceedings of the National Academy of Sciences of the United States of America

PNAS

Solution structure of the TLR adaptor MAL/TIRAP reveals an intact BB loop and supports MAL Cys91 glutathionylation for signaling



This paper describes the 3D structure of the protein Mal, which is a key protein in innate immunity and inflammation. Mal drives the activation of important immune cells called macrophages in response to microbes. Its structure has revealed important information on how it works, and in particular how it needs to be modified by a chemical process called glutathionylation for it to work properly. This information adds to our knowledge of the innate immune response which may prove useful in the



Luke O'Neill, TBSI and Dr Rebecca Coll, University of Queensland, Institute for Molecular Bioscience (former LON group)

effort to reign in this response when it goes out of control in inflammatory diseases

Media: [PNAS](#)



Loss of the molecular clock in myeloid cells exacerbates T cell-mediated CNS autoimmune disease. Time of day affects severity of autoimmune disease. In the new study, **Professor Kingston Mills** and **Dr Caroline Sutton** of Trinity College Dublin, and **Dr Annie Curtis** of RCSI (Royal College of Surgeons Ireland), and colleagues show that immune responses and regulation of autoimmunity are affected by the time of the day when the immune response is activated. *Nature communications* www.nature.com/articles/s41467-017-02111-0

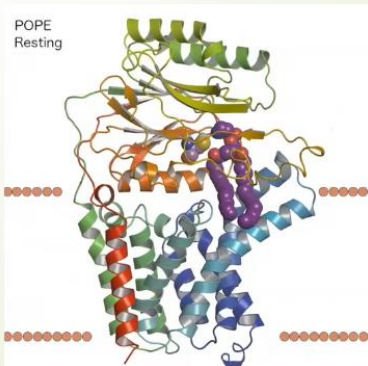
PUBLICATIONS

Scientists produce battle-plan blueprints for attacking disease-causing bacteria

Professor Caffrey said: "The structural blueprints of the two bacteria -- while very similar -- differ in their fine detail. These subtle differences might be exploited to design species-specific therapies with a reduced likelihood for the development of antibiotic resistance."

Speaking about the difficulty in designing 'silver-bullet' drugs that could turn the tide, and about the next steps in his team's work, **Professor Caffrey** added: "The structural blueprints generated as part of this study provide a basis whereby the differences between the bacterial enzyme and the immune response proteins might be exploited with the goal of producing a drug that only hits the bacterial target." *Nature Communications* (DOI: 10.1038/ncomms15952).

Membrane Structural & Functional Biology Group research sheds light on a potential new antibiotic target



Creating a Lipoprotein

The Lnt enzyme (ribbon) employs a stepwise ping-pong reaction mechanism to synthesise lipoprotein (spheres). MD simulations done at the Irish Centre for High-End Computing (ICHEC)

Lipoproteins serve essential roles in the bacterial cell envelope. They are molecular fingerprints by which our immune system recognizes and responds to bacterial infections. The enzymes that synthesise lipoproteins are potential targets for the development of urgently needed new antibiotics. The high-resolution structure of one of these enzymes, Lnt, is reported here. It can now be used to understand how Lnt works at a molecular level as a nanomachine and for the design and discovery of new antibiotics with minimal off-target effects.

"Structural insights into the mechanism of the membrane integral N-acyltransferase step in bacterial lipoprotein synthesis" *Nat. Commun.* 10.1038/NCOMMS15952, 2017



Media: [Nature article](#) [TCD Press](#)

Three-Dimensional Bioprinting of Polycaprolactone Reinforced Gene Activated Bioinks for Bone Tissue Engineering.

Regeneration of complex bone defects remains a significant clinical challenge. In this study Danny Kelly and his team sought to use bioprinting to engineer nonviral gene activated constructs reinforced by polymeric micro-filaments.

Media: [Liebert Pub](#)

Scientists discover the engine that powers cancer-killing “Natural Killer” cells – and that cholesterol-like molecules switch it off

Dublin, Monday September 18th, 2017 – Scientists have just discovered how the engine that powers cancer-killing cells functions. Crucially, their research also highlights how that engine is fuelled and that cholesterol-like molecules, called oxysterols, act as a “cut-off” switch making it hard for our Natural Killer cells to win the war against cancer. The scientists, led by Ussher Assistant Professor in Immunometabolism at Trinity College Dublin, **Dr David Finlay**, have just published their findings in leading journal *Nature Immunology* (<http://dx.doi.org/10.1038/ni.3838>). They report a previously unknown metabolic switch, which is essential for initiating the anti-tumour actions of Natural Killer cells

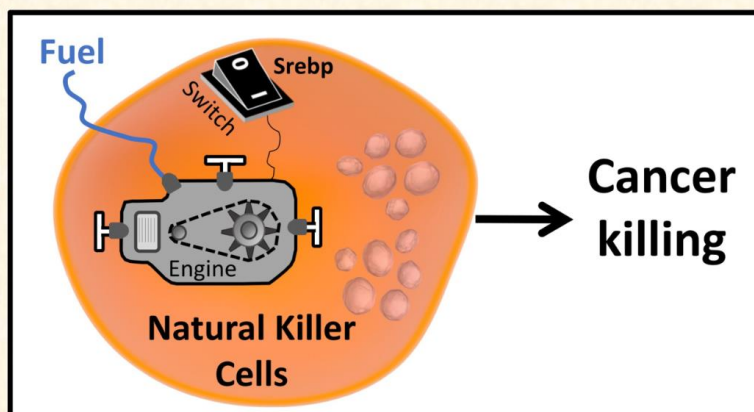
The Finlay lab have discovered a novel Srebp-dependent metabolic configuration that powers our Natural Killers against cancer



Nadine Assmann



Katie O'Brien



Recently published in *Nature Immunology*

<http://dx.doi.org/10.1038/ni.3838>

The engine used by cancer-killing ‘Natural Killer’ cells is turned on by a protein called Srebp, which can be blocked by certain sterols like cholesterol.

Natural Killer (NK) cells are immune cells that play an important role in our defence against cancer, as they can directly kill tumour cells. Once activated, NK cells increase their uptake of cellular fuel, which is converted into energy by a biochemical engine. These engines and their fuel thus power the all-important tumour-killing machinery of the NK cells.

The new research shows that activated NK cells use a very different engine configuration to that observed in other immune cells and that the key factor that switches NK cells to this engine



configuration is a protein called 'Srebp.' When the scientists used oxysterols to prevent this switch from occurring, the NK cells failed to kill tumour cells.

Dr David Finlay said: "The function of Srebp -- the key factor that controls the energy production in Natural Killer cells and thus fuels their activity -- is known to be blocked by cholesterol and cholesterol-like molecules, called oxysterols. Therefore, our findings reveal a previously unknown way that the cancer killing functions of Natural Killer cells can be disrupted."

As tumour cells can produce oxysterols and cholesterol levels tend to be higher in people with obesity, the scientists believe they may now have part of the explanation for why NK cells typically perform poorly in patients living with cancer and obesity

"The next step is to investigate whether the functions of Natural Killer cells are indeed impaired in individuals with high cholesterol level, and whether cholesterol lowering interventions can restore NK cell function in these individuals." **Dr David Finlay** said: "The function of Srebp -- the key factor that controls the energy production in Natural Killer cells and thus fuels their activity -- is known to be blocked by cholesterol and cholesterol-like molecules, called oxysterols. Therefore, our findings reveal a previously unknown way by which the cancer-killing functions of Natural Killer cells can be disrupted." Media: [Nature article](#) [TCD press](#)



Malaria parasite DNA-harbours vesicles activate cytosolic immune sensors **Andrew**

Bowie's paper out December 2017 in Nature Communications explaining how Malaria DNA triggers innate immune sensors - collaboration between TCD and Weizmann. The research is published in the journal **Nature Communications**

Media: [TCD Press](#) Irish Times online 8 December 2017:

The parasite that causes malaria is capable of deceiving the immune system, according to a new study by scientists at Trinity College Dublin.

The researchers found that the parasites, Plasmodium falciparum, can use a form of communication to send a misleading message to the body's protective shield.

The fresh insight could help with the development of new treatments for the disease, which infects 200 million people all over the world every year, killing around 500,000 of them.

Most of the casualties are children under five, with around 1,000 young children losing their lives to the disease every day. The team from the School of Biochemistry and Immunology in Trinity College Dublin found that within the first 12 hours after they infect red blood cells, the malaria parasites release nanovesicles. These tiny DNA-filled objects are capable of breaking into monocytes - the cells that form the initial barrier in the immune system and summon help from specialist infection fighting cells.

But the team also discovered that malaria parasites go a step further. "When our immune system responds to pathogens such as malaria, it's a double-edged sword," said Professor in Immunology at Trinity College Dublin, Andrew Bowie. "The wrong kind of response can actually favour the pathogen and lead to more harm than good." "And it seems that malaria parasites actually switch on an immune response to their own DNA to survive longer." "Here we found the switch mechanism for this, an immune sensor called STING which senses DNA from the malaria nanovesicles when it is delivered into



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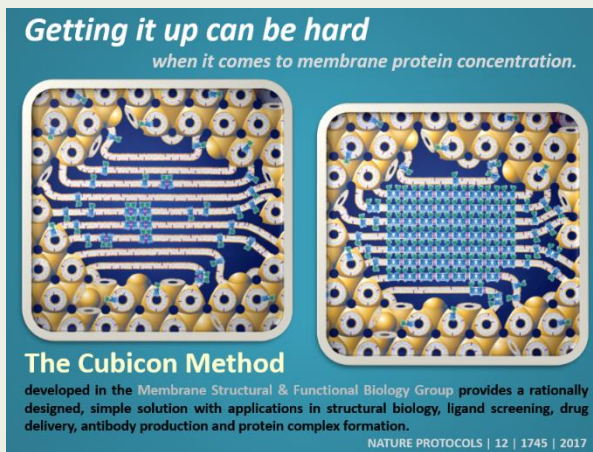
monocytes." "Through STING, malaria parasites fool the immune system into inappropriate responses that favour the parasite's survival."

The scientists say the discovery might enable them to find a way to disrupt the mechanism that allows malaria to evade the immune system, opening the door to possible new ways of blocking the infection. The findings build on earlier discoveries by Dr Neta Regev-Rudzki of the Weizmann Institute in Israel that revealed the manner in which malaria parasites are able to communicate with each other during the incubation stage.

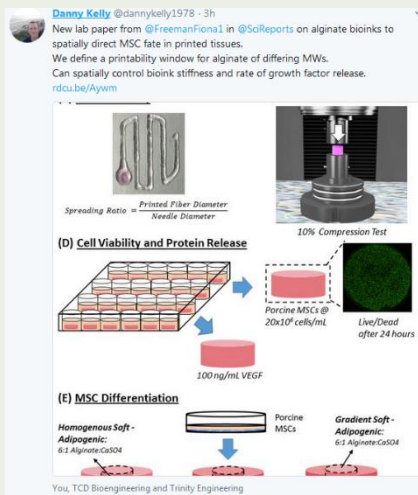
The Cubicon Method

 developed in the Membrane Structural & Functional Biology Group.

NATURE PROTOCOLS | 12 | 1745 | 2017 Media: [Nature](#)



Developed in the Membrane Structural & Functional Biology Group provides a rationally designed, simple solution with applications in structural biology, ligand screening, drug delivery, antibody production and protein complex formation.



Tuning Alginate Bioink Stiffness and Composition for Controlled Growth Factor Delivery and to Spatially Direct MSC Fate within Bioprinted Tissues

 Fiona Freeman and Danny Murphy:

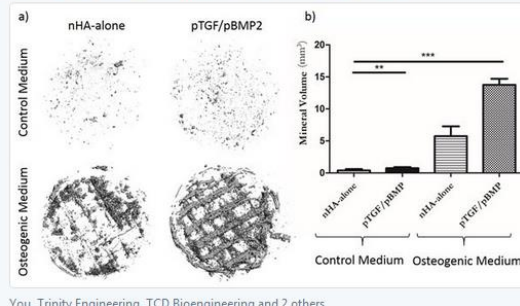
Scientific Reports, [Nature](#)

In this study, adult stem cells were printed inside soft and stiff hydrogels, termed bio-inks. When printed inside soft inks, the stem cells tended to generate adipose tissue. When printed in stiff inks, the same stem cells produce a more bone-like tissue.

Three-Dimensional Bioprinting of Polycaprolactone Reinforced Gene Activated Bioinks for Bone Tissue Engineering



New lab paper from @cunniffg + @TomyG90 on bioprinting of gene activated bioinks doi.org/10.1089/ten.tea.2016.0498 - in special issue of @TissueEngin



Tissue Engineering Part A: Cunniffe Gráinne M., Gonzalez-Fernandez Tomas, Daly Andrew, Sathy Binulal N., Jeon Oju, Alsberg Eben, and Kelly Daniel J.. Tissue Engineering Part A. August 2017, ahead of print. <https://doi.org/10.1089/ten.tea.2016.0498>

Media: [Tissue engineering](#) special edition

Sensitive fluorescence on-off probes for the fast detection of a chemical warfare agent mimic Mathias Senge (pictured left)



Two highly sensitive probes bearing a nucleophilic imine moiety have been utilized for the selective detection of chemical warfare agent (CWA) mimics. Diethyl chlorophosphate (DCP) was used as mimic CWAs. Both iminocoumarin-benzothiazole-based probes not only demonstrated a remarkable fluorescence ON-OFF response and good recognition, but also exhibited fast response times (10 seconds) along with colour changes upon addition of DCP. Limits of detection for the two sensors 1 and 2 were calculated as 0.065 µM and 0.21 µM, respectively, which are much lower than most other reported probes. These two probes not only show high sensitivity and selectivity in solution, but can also be applied for the recognition of DCP in the gas state, with significant colour changes easily observed by the naked eye. Media: [Science Direct](#)

Selio lung biopsy device exemplifies medtech growth and scale

Colm McGarvey and Garrett Ryan are eliminating collapsed lung complications



Selio co-founders Colm McGarvey and Dr Garrett Ryan: based in Trinity College Dublin, their novel medical device will transform lung biopsy procedures by eliminating collapsed lungs.

SELIO may still be made up by just two people, Colm McGarvey and Dr Garrett Ryan (pictured left), but it has cleared big hurdles within a short period and early endorsement has come with a series of innovation awards. A collapsed lung occurs when the lung biopsy needle pierces the lung and air escapes into the chest cavity. This substantially increases the cost of care by converting an outpatient procedure to one requiring hospitalisation, explains McGarvey – its frequency is stark; arising in some 33 per cent of cases.

He outlines the significance of their product in the context of lung cancer; the most common cancer worldwide – with over 1.8 million cases diagnosed globally, including about 2,300 Irish cases every year. Lung biopsies are the most common method for diagnosis – by way of transthoracic needle biopsy (TTNB) but they can be hazardous because of collapsed lung risk. Media: [Irish Times](#)



Congrats to Barry Moran for his recent paper:



Hidradenitis suppurativa is characterised by dysregulation of the Th17:Treg cell axis, which is corrected by anti-TNF therapy

Barry Moran, Cheryl M. Sweeney, Rossini Hughes, Anna Malara, Shivakshi Kirithi, Anne-Marie Tobin, Brian Kirby, Jean M. Fletcher



Selected as Editor's Choice in Science Translational Medicine (9 July 17)

Defining targets to defeat hidradenitis suppurativa

Science Translational Medicine 9(376):raa000000

Hidradenitis suppurativa A research team led by Usher Assistant Professor in Translational Immunology Jean Fletcher, researcher Barry Moran, both at TBSI, and dermatologists Professor Brian Kirby at St. Vincent’s University Hospital, and Dr Anne-Marie Tobin at Tallaght Hospital, studied the cells that were most active in the blood and skin of HS patients compared with healthy volunteers. This approach led them to identify particular inflammatory cells in the skin of HS patients, known as Th17 cells, as key mediators of the

disease. The work relied on the high-end, SFI-funded Flow Cytometry Facility at the Trinity Biomedical Sciences Institute. It was a collaborative effort between translational scientists in the Schools of Biochemistry and Immunology and the School of Medicine in Trinity, and collaborators from Tallaght Hospital and St. Vincent’s University Hospital, UCD. Media: [TCD Press](#)



Cell-based therapies for intervertebral disc and cartilage regeneration— Current concepts, parallels, and perspectives

Srujana Vedicherla, Conor T. Buckley

J Orthop Res. 2017 35(1):8-22 Media: [Wiley](#)

Degenerative Disc Disease (DDD) and Osteoarthritis (OA) are painful activity limiting conditions with global health consequences. Significant advances have been made in the fields of tissue engineering and regenerative medicine over the last 20 years with cell based therapies for cartilage repair having achieved successful clinical and commercial translation. However, orthobiologic approaches to treat DDD appear to be lagging, despite being a more prevalent, debilitating condition, significantly impacting quality of life. In this article, we trace the developments behind the translational success of cartilage repair, and examine elements to consider in achieving disc regeneration. Adopting some of the endeavours from cartilage repair strategies could perhaps harness a translatable, regenerative surgery for DDD with cell source, cell processing, and delivery being key design considerations. We further discuss clinical parameters such as target population identification and stratification, and identify multidisciplinary collaboration between clinicians, industry, and researchers as being critical to deliver improved regenerative cell-based strategies for DDD.



Trinity Researchers Make Motor Neuron Breakthrough.

The researchers were from Trinity's Academic Unit of Neurology, Dr. Bahman Nasserolelami, Senior Research Fellow and Neural Engineer, who is the lead author of the study (pictured here). In a press statement, Prof Orla Hardiman, Head of the Academic Unit of Neurology, said that these discoveries will “revolutionise” how changes in brain function of

those suffering from motor neuron disease are measured. These findings imply that MND, along with other neurodegenerative conditions, are associated with important changes in neural communication between different brain networks, rather than changes in a single region of the brain. The new discoveries are pointing to the mechanisms in the brain that are associated with the disease, that were



not previously taken into account, assuming that MND is simply a focal isolated degeneration in certain parts of the brain. Media: [Cerebral Cortex](#) [TCD press](#)



World's first nutrigenomic supplement for horses will boost exercise performance.

This research was funded by Science Foundation Ireland and The world's first nutrigenomic supplement for horses, which contains the compound Co-enzyme Q10 (CoQ10). CoQ10 is a key nutrient required for the generation of energy in the mitochondria of the muscle that is particularly important for sustained exercise. Increased levels of CoQ10 may result in more efficient energy production, delayed onset of fatigue during exercise, an improved response to exercise training and enhanced recovery following intense exercise. The field trial research was funded by an Enterprise Ireland Innovation Partnership Programme grant with Plusvital, which was awarded to Associate Professor in Biochemistry from TBSI's School of Biochemistry and Immunology, Richie Porter. **Media:** [Thoroughbred daily news](#) [Irish Tech news](#) [TCD Press](#)

GRANTS AND AWARDS

Five Trinity researchers have been awarded a Health Research Board-funded Emerging Investigator Award, designed to enable mid-career researchers to shift gear and progress to becoming independent investigators. The Health Research Board has awarded €8.3 million to support 11 mid-career researchers in becoming principal investigators at their host institutions. The Trinity-based projects include one led by **Dr Mark Robinson**, who will work in Trinity's Translational Medicine Institute. Robinson's new work will focus on liver cirrhosis, which occurs when normal liver tissue is replaced by scar tissue, leading to the eventual failure of the organ. The project will involve patients with liver cirrhosis and aims to use advances made in immunology to determine the rate of progression of the disease, with the ultimate hope of predicting the risk of liver failure and stopping the progression of cirrhosis. **Dr Peter Bede**, Specialist Registrar in Neurology, will lead a project on the diagnosis and monitoring of Amyotrophic Lateral Sclerosis, a neurodegenerative disease for which there is currently no effective treatment

Media: [University Times](#)

Minister John Halligan announces research investment of €43 million through SFI Investigators Programme

96 researchers get backing for 26 projects. The 26 projects under the programme cover many different areas of sci-tech, but the most notable is an effort to develop new types of antibiotics, led by TBSI's Prof Martin Caffrey. It received the single greatest amount of funding, at €2m.

Of Note: of the Irish universities where research projects are being funded, TCD has achieved the greatest success with nine projects, followed by University College Cork and University College Dublin, with three projects each.



L-R: Adrian Bracken, Prof Mark Ferguson (SFI), Minister John Halligan, Jane Farrar, Peter Humphries, Louise Bradley, John Boland, Andrew Bowie, Kingston Mills, Martin Caffrey

Prof Martin Caffrey, €2,019,877

A High-Resolution Crystal Structure Approach to Targeting Bacterial Lipoprotein Post-translational Processing Enzymes For Antibiotic Design And Discovery

Lipoproteins play key roles in bacteria. They are synthesized by enzymes that are essential in many pathogenic bacteria. Because they have no equivalents in humans, these enzymes are potential drug targets. We determined the crystal structure of one of these enzymes bound to an antibiotic. In this project, we propose to exploit this valuable molecular blueprint and those of related enzymes to develop new antibiotics targeting pathogens against which a growing number of antimicrobials are ineffective. The project will generate new knowledge and intellectual property in the form of tools, reagents and lead compounds for commercial exploitation.

Prof Andrew Bowie, €1,947,730

Modulation of innate immune responses by SARM, a new therapeutic target in inflammatory disease

Inflammation is normally a protective process initiated to combat pathogens and resolve tissue injury. Pattern recognition receptors (PRRs) and inflammasomes of the innate immune system direct inflammatory reactions, and when these are uncontrolled, diseases such as rheumatoid arthritis and inflammatory bowel disease can develop. The researchers have found that SARM, an ancient protein found in worms, flies and mammals, can regulate PRRs and inflammasomes in mammalian cells, to shape and direct inflammation. In this project they will examine how SARM works, in order to better understand how inflammation is controlled, which will allow new anti-inflammatory therapies for human disease to be developed.

Kingston Mills, €1,996,376

Understanding the role of T cells in sustained protective immunity to Bordetella pertussis to inform the design of third generation vaccines against pertussis

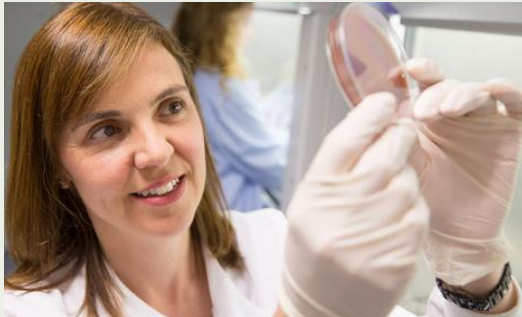


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Whooping cough (pertussis) is a severe and sometimes fatal infectious disease of the respiratory tract caused by the bacterium *Bordetella pertussis*. Pertussis vaccines developed in the 1940s were effective but caused side effects and were replaced by more refined acellular pertussis (aP) vaccines in the 1990s. Unfortunately, the newer aP vaccines, while safer, are not as effective and pertussis is now re-emerging as a serious threat to children's health. This project will exploit the researchers' expertise in immunology to make fundamental discoveries that will inform the design of a more effective third generation vaccine to control the re-emergence of pertussis. **Media:** [Siliconrepublic](#) [SFI research news](#)

Award: Science Foundation Ireland (SFI), in partnership with Wellcome and the Health Research Board (HRB)



Pictured left is TBSI's Dr. Rachel McLoughlin of the recipients, of three Trinity researchers have secured prestigious SFI-HRB-Wellcome Investigator Awards worth a combined total of approximately €5.5 million

Media: [Irish Times](#) [Siliconrepublic](#) [TCD Press](#)

[University Times](#)

H2020 Marie Skłodowska-Curie Innovation Training Network

Professor Lorraine O'Driscoll has been awarded **€3.9 million** for extracellular vesicles cancer research. The programme is in collaboration with European partners at Institut Curie Paris, Utrecht University, Ghent University, Semmelweis University Budapest, Freiburg University, University of Porto, and industry including Lonza, HansaBioMed, Bioinf2Bio, GVS SpA, AJ Innuscreen GmbH, Exosomics Siena SpA, BD Biosciences and Thermo Fisher. Lorraine O'Driscoll in her interview with **Yolanda Kennedy**, Press Officer states "TRAIN-EV's objective is to develop academic and industry EV leaders for the future through excellent and integrated multi-disciplinary and inter-sectoral training of a critical mass of early-career researchers. The researchers will have outstanding potential in the academic, clinical, and industry/business components of exploiting exosomes and other EVs. They will also perform novel, cutting-edge research and generate new knowledge. This will be achieved by training 15 PhDs in leading universities, clinics and industries offering secondments." **Media:** [TCD press](#)

TBSI's David Finlay ERC Grant award

ERC Consolidator Grants are awarded to outstanding researchers of any nationality and age, with at least seven and up to 12 years of experience after PhD, and a scientific track record showing great promise. Funding is provided for up to five years and mostly covers the employment of researchers and other staff to consolidate the grantees' teams. Professor McLysaght and Dr Finlay's awards account for two of the five won by scientists at Irish institutions this year and amount to a worth of (combined total) €3.8 million to pursue cutting-edge research projects. Dr Finlay's ERC funding will support three team members, two postdoctoral researchers and one PhD student to help pursue this research.



Irish researcher bags €150,000 to make 3D-printed knee implant: TBSI's



Shauna Quinn (third from left) and the Letswakeapp team at LERU's doctoral summer school.

Danny Kelly is in receipt of a European Research Council's Proof of Concept grants, and will now spend the next 18 months developing his 3D-printed project entitled 'Anchor'. Media: [Siliconrepublic](http://Siliconrepublic.com)

PhD Biochemistry and Immunology student, Shauna Quinn wins award – her **stress-free alarm idea** wins **LERU citizen science competition**. What Shauna said... "Our team was international, intercultural and interdisciplinary. Our project 'letswakeapp, can we find our perfect alarm?' was created around the idea that the modern alarm is not conducive to an essential healthy early morning mind-set. Instead, harsh programmed tones evoke stressful feelings, which then have a negative impact on our daily productivity, making gloomy mornings that bit harder."

"We are a generation of alarm clock users and the long-term negative impacts of the constant abrupt awakening by these alarms is unknown. Our aim is to use citizen scientists to find the preferred alarm sound on an individual basis and, at the same time, collect data on the impact of sounds, which may also benefit researchers." Media: TCD Press



Congratulations to **Nicole Campbell** (Dunne lab) who was winner of this year's **Thesis in 3**: Trinity College Dublin Final and was also one of the 4 finalists in the 2017 HRB Ones to Watch Competition. Nicole (far left) pictured with Fergal O'Shaughnessy, Royal College of Surgeons in Ireland; Deirdre Daly, TCD; Margaret Dunne, TCD; Anne Cody, HRD

Key Leaders in the Irish Research Community recognised by **Science Foundation Ireland** at the **2017 Science Summit Awards**. SFI Early Career Researcher of the Year: The SFI Early Career Researcher Award



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recognises outstanding early career research talent. Recipient: Dr Rachel McLoughlin pictured here with her award.



Dr Rachel McLoughlin is recognised internationally as a leading researcher in *Staphylococcus aureus* host pathogen interactions. Commenting on her delight at receiving the award Dr McLoughlin said; “I am extremely honoured to have been selected for this award and grateful to SFI for their continued support of my research programme. This is a wonderful endorsement of the impact that our work is making. I look forward to continued discoveries that will further

our understanding of how bacteria interact with the immune system, to advance treatment strategies that will ultimately help to control the global epidemic of antibiotic resistant infections” **Media:** [SFI news](#)



Researchers at Trinity College Dublin were acknowledged for their innovative research and entrepreneurship at the Trinity Innovation Awards 2017 special awards ceremony on November 27th 2017. The highest accolade, the Provost Innovation Award went to TBSI’s Professor of Biochemistry, Luke O’Neill for his outstanding contribution to Innovation throughout his career. To learn more about Trinity Research and Innovation and the contributions of TCD researchers, [please read](#)

The new Director of Trinity Research and Innovation, Leonard Hobbs said: “Over the past 30 years Trinity campus companies have raised more than €200 million in private investment; enabled the direct creation of more than 3,000 jobs and have delivered over €1.2 billion in exports. All of tonight’s prize winners of the Trinity Innovation Awards have played an active part in this. We are proud of this contribution to society and the economy, and aim to build on it further by leading innovation at Trinity.”

Media: [TCD Press](#)



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Dr **Natalia Muñoz-Wolf**, Lavelle lab, School of Biochemistry and Immunology, TBSI was awarded the inaugural '**Thomas Mitchell Medal of Excellence**' by the Irish Research Council for being the top-ranked postdoctoral researcher in the science, technology, engineering and mathematics category. Dr Muñoz-Wolf's research is investigating determinants of morbidity and mortality in pneumococcal disease and vaccination



TBSI Researcher **Lucy Bergin** Awarded Best Oral Presentation at the 2017 Scientific Meeting of the Irish Thoracic Society (ITS) Lucy's award-winning presentation detailed her research into the effect of IL-17A on Toll-like receptor 3 function in disease progression in idiopathic pulmonary fibrosis (IPF).

The conference delegates included healthcare professionals and research scientists, involved in the care of people with chronic or acute respiratory disease in Ireland. Left: John Barron, Hospital Specialist at Boehringer Ingelheim

Centre: Lucy Bergin, Donnelly Research Group
Right: Dr Jacqueline Rendall, Outgoing President of the Irish Thoracic Society



Congratulations to Sarah Corcoran (pictured left) who won best poster prize at the Immunometabolism conference I Fiji.

Congratulations to PhD student Michelle Lowry on being awarded the Irish Cancer Society PhD student of 2017 gold medal.



Michelle Lowry has recently started the final year of her PhD under the supervision of Prof. Lorraine O'Driscoll in the School of Pharmacy & Pharmaceutical Sciences [and based in Trinity Biomedical Sciences Institute].

Michelle's PhD is focussed on a particular type of breast cancer, known as HER2-overexpressing breast cancer. Her research is helping us to understand why cancer cells develop resistance to anti-cancer therapies and, in particular, to the new anti-cancer drug neratinib. This research, made possible by an Irish Cancer Society grant to Prof.

O'Driscoll as part of Breast-Predict, is also finding ways to overcome this resistance. So far Michelle's research has contributed to 3 peer-review research publications; a prize-winning presentation at the International Society for Extracellular Vesicles conference in Toronto, May 2017; multiple published abstracts and national oral and poster presentations; and multi-media public engagements via radio and in person. Michelle was one of 3 shortlisted finalists selected by the Irish Cancer Society to progress to presenting her research to a public audience in the House of Lord, Bank of Ireland (last night). From this, the judging panel -including a cancer patient, a leading cancer researcher, and communications experts- deemed Michelle to be the overall winner and gold medal recipient.

RESEARCH SUPPORT PROVIDED AT TBSI

Trinity Research and Innovation interfaces internally with Trinity College Academics and administration units and externally with industry, funding agencies and government bodies. TR&I provides supports and advice along the continuum from research funding application, through to contract signature through intellectual property management to exploitations by licensing to campus company or to established industry. Trinity Research and Innovation comprises of three offices;



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Research Development Office - supports Trinity researchers by providing information and advice on sources of research funding and calls for proposals. For local access to support services, documents & forms, and external research funding opportunities, please find [here](#).

Contracts Office – advises and negotiates the terms of all research contracts, collaboration and partnership agreements. The office executes all research funding contracts on behalf of the university. Link [here](#)

Office of Corporate Partnership and Knowledge Exchange – the mission of the OCPKE is to promote Trinity as a partner of choice for industry and business, to support access to intellectual property and to provide knowledge-based services to companies. Link [here](#)

Research Focus is a weekly email newsletter compiled by the Research Development Office team to alert TCD staff to Latest External Research Funding Opportunities and Latest Events and Notices. Members of staff who wish to subscribe to the TCD research newsletter Research Focus are invited to complete a short form [here](#). **For locally based research funding support and access to monthly funding bulletins, please contact the following:**



[Dr Patricia Doherty](#) – Senior Research Programme Officer (Cancer) L1.04 TBSI
(also in SJH) EXT: 3376 Patricia.Doherty@tcd.ie



[Dr Hayley Furlong](#) – Research Programme Officer (TBSI) 7.07 TBSI hfurlong@tcd.ie EXT: 4425

EDUCATION

Message from Dean and Vice President for Research, Professor John J Boland

Dear Colleagues,

The 2018 edition of the Times Higher Education (THE) World University Rankings have just been announced, and I am delighted to share with you the news that Trinity has improved its position by 14 places to 117th in the world.

This is a significant improvement on last year's ranking of 131st and comes despite the headwinds associated with the vastly superior funding levels of our international competitors. This year's performance reflects the strength and reputation of our teaching, increased citation levels of our research and a continued growth in industry funding.



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I would like to thank you all for your continued hard work and dedication, and to congratulate you on the vital contribution you make to the University's success. In particular, I would like to commend the work of the Trinity Rankings Project in preparing and returning the University's submissions. This approach, which draws on resources from across the University, ensures a consistent and professional approach to international rankings, commensurate with Trinity's status as a world class research-led university.

Coming as it does at the start of the new academic year, I hope that this good news will encourage and inspire you all as we welcome a new generation of students to Trinity.

OUTREACH:

PROBE September 2017:



Members of the Public were invited to a 'behind-the-scenes' look at cancer research. This Cancer Research Frontiers public symposium, was held on Friday, September 29th in TBSI, the programme included:

Liver Anti-Tumour Immune Cells: Professor Cliona O'Farrelly, Professor of Comparative Immunology, Trinity Biomedical Sciences Institute

Exosomes: our Friends or Foes in Cancer? Professor Lorraine O'Driscoll, Professor in Pharmacology, School of Pharmacy and Pharmaceutical Sciences

Natural Killer Cells vs Cancer: Dr David Finlay, School of Biochemistry and Immunology and School of Pharmacy and Pharmaceutical Sciences

Exercise Rehabilitation in Cancer: Supporting Patients throughout their Cancer Journey: Dr Emer Guinan, Assistant Professor, School of Medicine



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Swallowing Difficulties in Cancer: Ciaran Kenny, Research Fellow, Department of Public Health and Primary Care, School of Medicine, Trinity College Dublin; Academic Department of Palliative Medicine, Education & Research Centre, Our Lady's Hospice and Care Services Media: [TCD Press](#)

Trinity remains European leader in producing entrepreneurs

'Specific success stories over the past year include Inflazome, founded by Trinity alumnus and Professor in Biochemistry, Luke O'Neill, which raised €15 million in September 2017' Media: [TCD news](#)

2017 Universities Report

August 30, 2017

Share:



Network connections can be created anywhere. But universities may offer the most ample opportunities to create a strong link between great minds, planting the seed to future partnerships, and potential investment.

The network effect is a major driver of the VC industry. Founders may lean upon their connections when cultivating an idea or looking for investment. The 2017-2018 edition of the PitchBook Universities Report provides data on where founders have gone to school, ranking the top universities and graduate programs in order of the total number of founders they have produced.



Bioengineering's Bruce Murphy

The CroíValve device was invented and patented by one of the company's other three co-founders, Dr Martin Quinn, a consultant cardiologist at St Vincent's Hospital in Dublin who had previously been involved in developing concepts for the mitral heart valve. He joined forces with Professor Bruce Murphy at Trinity, who had developed a minimally invasive solution for the mitral valve and who had experience in securing early stage funding for this type of venture. Media: [Irish Examiner](#)



MED3DP initiative is using 3D-printing technology to produce on-demand medical devices, with huge potential benefits for developing countries. **Michael Monaghan from Bioengineering reports in the [Engineers Journal](#)**

Back, l-r: Susan Gunbay, Padraig Irwin, Michael O'Connor, Prof Michael Monaghan, Laura Taboada, Alice Brettle, Katelyn Genoud, Bruce McKee. Front l-r: Pedro Díaz Payno, Surbhi Hablani, Caroline Patel, Laura Perez-Denia, Dorina Birsanu, Elvira Ruiz Jimenez, Pooja Mandal, John Duffy, Paola Aprile

EVENTS

Postdoc Careers Day 13th October

On the 13th of October 2017, the **TBSI Postdoc Society** in collaboration with the **Postdoc Society** in the **School of Pharmacy and Pharmaceutical Sciences** organised a successful **Career Development Symposium in TBSI**. The symposium aimed to provide information and practical guidance to post-doctoral research fellows, PhD and MSc students from the Biomedical Sciences in terms of career opportunities (both within and outside academia) and methods to develop their career prospects. Link to Postdoc [Society](#)

The symposium was divided into morning and afternoon sessions. Speakers from national and international organisations representing (academia, industry, funding bodies, publishers and TCD) attended the event. The keynote speaker was Prof. Lydia Lynch from the School of Biochemistry and Immunology who shared her career experience to date. Interactive sessions in the afternoon were organised with 16 booths representing: academia, pharmaceutical companies recruiting agencies (APC, Novartis, Abbott, Life Sciences Recruitment, DePuy Synthes, HPRA, AbbVie and Medtronic), TCD research office support (Dr. Hayley Furlong), funding body (SFI), Science Gallery Dublin, publisher (Elsevier) and TCD human resources. The event was a success by attracting over 140 people. If support needed for the organisation of this type of events is obtained, this event should be reorganised in 2018.



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Prof Lydia Lynch, Keynote speaker



Ms. Karina Septore, TCD Careers Consultant



Novartis Panel



Dr. Marion Boland, SFI Head Post-Award



Interactive Session





OUT AND ABOUT





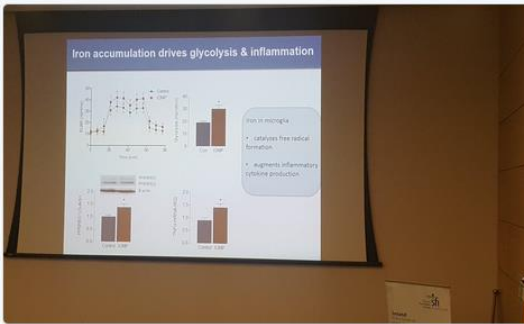
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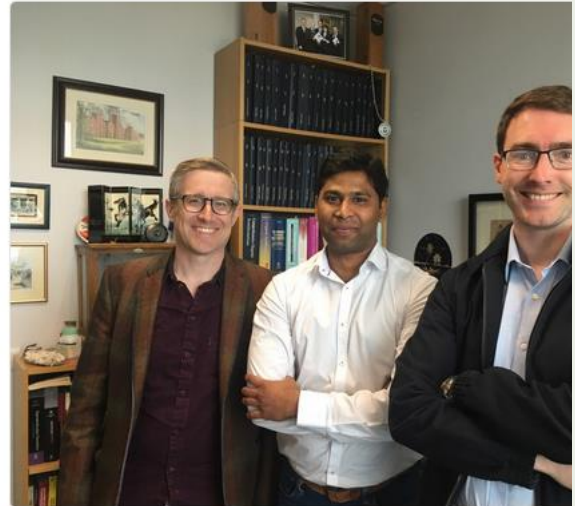
Irish Immunology @Irishimmunology · 3h
President of ISI Prof Ed Lavelle delivers his welcoming address at this years #IrishImmunology meeting



Irish Immunology @Irishimmunology · 1h
Excellent talk by Prof Marianna Lynch- increased iron accumulation drives glycolysis in microglia in Alzheimers diseasee #irishimmunology



Many congrats to Sachi on successful PhD viva! Here with the examiners @professor_dave & Eoin Scanlan @TCD_Chemistry



3 4 49



Video Intelligence Forum

Trends in Visual Data & Computational Systems

21st November 2017 | Dublin | Ireland



Tomás Ryan
@TJRyan_77

Following

Science should be a dialogue with the public. For people in Dublin tonight, come to TCD for a general overview of memory research. @tcddublin @tcdTBSI @TCINeuroscience @tcdbi @scienceirel

TrinityCollegeDublin @tcddublin

Replying to @tcddublin @tcdTBSI and 3 others

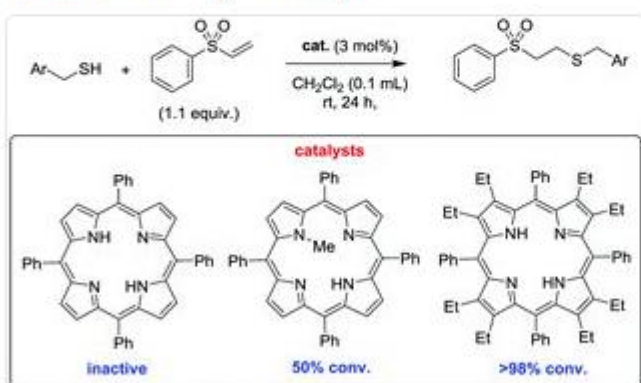
For a fascinating teaser, listen to this interview by @SeanMoncrieff with Professor @TJRyan_77 on @NewstalkFM: newstalk.com/podcasts/Moncr...





Mathias Senge @mathiassenge · 16h

stay tuned for the @ChemCommun cover publication on this super work by Marie Roucan and Marc Kilemann and productive coop with Prof. Connon from @tcdTBSI funded by @scienceirel + @TCD_Chemistry, finally a new role for #porphyrins in organocatalysis



1 2 6

Calendar of Events: July – December 2017

03/07/2017	MSc Immunology Poster Presentations
06/07/2017	MSc Neuroscience Poster Presentations
28/07/2017	Transport Pathway in Health and Disease
23/08/2017	Cancer and Immunology Workshop
07-08/09/2017	RCS Carb Symposium
12/09/2017	TCD Postgraduate Students Union
14-15/09/2017	Irish Society for Immunology
19-20/09/2017	IDS -TILDA 10 th Anniversary
21/09/2017	SFI Investigators Programme Award Announcements
23/09/2017	Naughton Foundation Scholarships
29/09/2017	PROBE-TBSI
10/10/2017	Trinity Business School
11/10/2017	Irish Cancer Society – Decoding Cancer
12/10/2017	HADD Ireland
13/10/2017	Career Development Symposium 2017 – Post Docs
20/10/2017	Global Experience Day – Study Abroad/Global Relations
20/10/2017	GSU Rep Training
21/10/2017	DUSEAS Event – Assist Workshop
23/10/2017	Physician Opportunities Canada – School of Medicine



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24/10/2017	Students Union Council
25/10/2017	Trinity MBA – LPD Industry Guest Series
25/10/2017	BPS Clinical Pharmacology Medical Student Competition
27/10/2017	Internship Speed Connect
31/10/2107	Trinity International Development Initiative
02/11/2017	School of Biochemistry and Immunology Graduation Event
06/11/2017	Primary Schools Event – Bugs and Beyond
13/11/2017	Blackboard International – User Event
13/11/2017	GSU Event
13/11/2017	School of Medicine – Junior Careers Night
16/11/2017	ISTA Senior Science Quiz
21/11/2017	Students Union Council
21/11/2017	Huawei, Video Intelligence Forum
24/11/2017	Biochemical Society Inaugural Event
24/11/2017	Trinity Access Programme/College Awareness Week
25/11/2017	ISTA Senior Science Quiz – Final
30/11/2017	Matrix Biology Ireland
01/12/2017	Frontiers of Neurology 7 th Annual Meeting
05-06/12/2107	MMI: Techniques and Strategies in Molecular Medicine
09/12/2017	TCD Open Day TBSI
12/12/2017	Student TED talks
21/12/2017	Dublin Midlands Hospital Group Strategic Plan Launch

DATE FOR YOUR DIARY

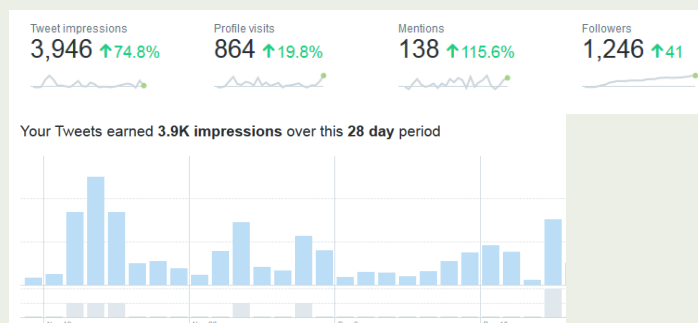
What is Life? 5th – 6th September 2018

TBSI DIGITAL SIGNAGE

The lift lobby screens on each of the floors can be used by all areas within TBSI to upload information. Contact Caroline if you require information on this at clevis@tcd.ie

SOCIAL MEDIA: join us on Facebook and Twitter

<https://www.facebook.com/tcdTBSI/> <https://twitter.com/tcdTBSI>





NEWS ITEMS

Mail clevis@tcd.ie with items for inclusion in the next newsletter.

Web links referred to in the newsletter:

Asthma and Eczema

http://www.tcd.ie/news_events/articles/scientists-unearth-cell-checkpoint-that-stops-allergic-diseases/8051

<http://jem.rupress.org/content/early/2017/07/25/jem.2017005>

<http://www.universitytimes.ie/2017/08/breakthrough-by-trinity-scientists-could-lead-to-new-treatments-for-asthma-and-eczema/>

Rogue messengers

https://www.tcd.ie/news_events/articles/discovery-of-rogue-messengers-that-hinder-body-s-immune-response-to-cancer/8229

<http://www.tandfonline.com/doi/full/10.1080/2162402X.2017.1362530>

<http://www.universitytimes.ie/2017/09/trinity-researchers-make-progress-in-breast-cancer-treatment/>

Cubicon method

<https://www.nature.com/nprot/journal/v12/n9/full/nprot.2017.057.html>

Forgotten memories: Tomás Ryan

Video

http://www.tcd.ie/news_events/articles/forgotten-memories-may-be-retrievable/8059

<https://www.youtube.com/watch?v=GT3ID4lxGhA#action=share>

Solution structure of the TLR adaptor MAL/TIRAP reveals an intact BB loop and supports MAL Cys91 glutathionylation for signaling

<http://www.pnas.org/content/early/2017/07/20/1701868114.long>

Scientists produce battle-plan blueprints for attacking disease-causing bacteria

http://www.tcd.ie/news_events/articles/scientists-produce-battle-plan-blueprints-for-attacking-disease-causing-bacteria/8065

Rachel McLoughlin SFI award Liebertpub.com

<http://www.sfi.ie/research-news/news/summit-awards-2017/>
<http://online.liebertpub.com/doi/10.1089/ten.tea.2016.0498>

Horizon 2020 funding

https://www.tcd.ie/news_events/articles/tcd-researcher-awarded-3-9-million-for-extracellular-vesicles-cancer-research/8331



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3D Printing

<http://www.engineersjournal.ie/2017/11/21/trinity-med3dp-medical-device-3d-printing/>

Tuning Alginate Bioink Stiffness and Composition for Controlled Growth Factor Delivery and to Spatially Direct MSC Fate within Bioprinted Tissues

www.nature.com
https://www.nature.com/articles/s41598-017-17286-1.epdf?author_access_token=iAB_wMxzwXfr3b8ydEEKYNRgN0jAjWel9jnR3ZoTv0Nrd9RLCb5cPmZQXzOTSxbR6QRC
AD5NZIWHfQsjnm_OhE_ibu64tmN0Kk_MIBsX7rpqRV2liui5yMSS
Egy3FVFXbrdLoauJurPgxstfVzScxA%3D%3D

Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

85 PARTNERSHIPS WITH INDUSTRY

The graphic displays a grid of logos for 85 industry partners, including: SOLVAY, Syngenta, ECF, GRUNTHAL, GreenStake, Abbott, nibrt, mundipharma, McEneaney, KAVIS SHIELD, OLYMPUS, Ovation, Roche, MSD, REGENERON, Alkermes, Ovelle, natura, X-BOLT, Unwin, AdnaGen, Pfizer, VISCOGEL, MERRION, psona, GlycoFi, bioseutica, bio lifec, EMED, Merck Serono, biogen idec, CARDIO3, Vasorum, NutraVera, cellix, Bristol-Myers Squibb, Dow, herbarium, INTEGRAL, genzyme, RANDOX, SERVIER, Boehringer Ingelheim, DSM, SHERWIN WILLIAMS, elan, TRIND THERAPEUTICS, esk, and MERCK.