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IGFS THE INSTITUTE
FOR GLOBAL
FOOD SECURITY

NEWSLETTER

DECEMBER 2018

It has been a busy and exciting period for staff and students over the past six months and our newsletter shares some of the fantastic activity at the Institute. I was delighted to officially launch the IGFS Ambassadors Programme in November, a key element of the work we're undertaking to enhance the reputation and visibility of the Institute at an international level. We have also seen the hard work of many staff rewarded with recent grant successes such as the £5m NERC award that will help train the next generation of world leading scientists.

As this year comes to a close we look forward to 2019, this will be an exciting year for the Institute as we move into the new Biological Sciences building and our staff and industry partners can come together and avail of truly world-class facilities. I would finally like to take this opportunity to thank all staff, partners and stakeholders that have contributed to IGFS's growth and achievements throughout 2018. I wish you all a Merry Christmas and a Happy New Year. - **Professor Nigel Scollan, Director**



Top names in UK agri-food get behind Institute for Global Food Security



Pictured, from left to right, Mr Stuart Lendrum, Ms Janet McCollum CBE, Mr Tony O'Neill OBE, Mr Eric Reid, Ms Heather Jenkins, Mr Owen Brennan, Professor Nigel Scollan and Mr Stephane Durand (not pictured - Dr David Dobbin CBE)

Key figures from the UK agri-food industry are to become official 'Ambassadors' for the Institute of Global Food Security. These experienced executives will facilitate engagement at national and international level, under the chairmanship of Tony O'Neill OBE.

Launching the Ambassador scheme on 03 December 2018 **Professor Nigel Scollan,**

Director of IGFS, said the Ambassadors would extend the reach of IGFS at a high level. He said: "We realised there was an untapped opportunity, where individuals with access to key networks in UK, ROI, the US and beyond, could help us foster new relationships and build on existing ones. The Ambassadors we have selected have a high level of expertise and knowledge so this will be engagement on an ambitious scale, talking to decision-makers and senior

personnel – across policy, business and academia."

Ambassadors Chair **Tony O'Neill OBE** said the group was also about promoting a safe and robust food industry for Northern Ireland, underpinned by a robust, scientific evidence-base from IGFS. He said: "The work IGFS is doing in this space is unique – the model doesn't exist anywhere else in the UK. In that sense we are indebted to the trailblazing work of IGFS founder, Professor Chris Elliott. We now have a real opportunity to build upon that work and create a world-leading food system here in NI, in terms of quality, integrity and traceability. NI has a natural advantage in that supply chains are relatively short and safe. Put that together with the world-leading research taking place at IGFS and you have something very special. Brexit may be a challenge, but it could also be the opportunity to develop a strong NI food brand, joined up right across the supply chain, from fundamental research through to the product on your plate."

Our thanks to all staff that contributed to, and supported, this launch event.

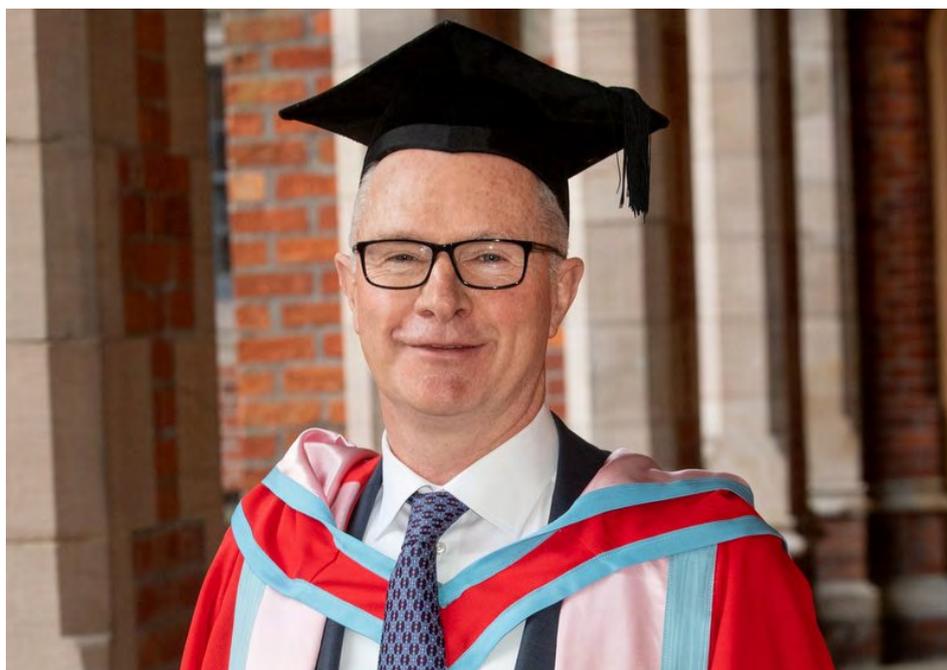
Queen's University Belfast awards honorary degree to Owen Brennan

The Institute was delighted to see one of their closest colleagues, Mr Owen Brennan, receive an honorary degree from Queen's University on 14 December in acknowledgement of his services to business in Northern Ireland.

As many of you will already know, Owen is Executive Chairman of Devenish Nutrition, delivering innovative nutritional products and solutions for the feed industry, the food industry and for human health. Headquartered in Belfast, Devenish has nine manufacturing sites across NI, GB, USA and Uganda and exports to over 35 countries worldwide.

Devenish are also one of IGFS' key stakeholders, partnering on many research projects, and the company sits on the Industrial Advisory Board of IGFS and has been central to the evolving strategic direction taken by the Institute.

More recently, Owen has kindly offered to become an 'Ambassador' for IGFS, leveraging his significant networks to promote the Institute at national and international level.



Raised on the family farm in County Carlow, Owen holds a Degree in Agricultural Science and an Honorary Degree of Doctor of Science from University College Dublin and was awarded an MBA from the Smurfit Business School. Under his leadership, Devenish was awarded the Queen's Award for Enterprise in International Trade in 2016 and the Belfast Telegraph Cup was awarded to

Owen for services to the sector in 2015.

Previously serving as President of the Northern Ireland Grain Trade Association and Chairman of the Livestock and Meat Commission, Owen also served on the Agri-Food Strategy Board for Northern Ireland.

QUB Food students attend IFST Launchpad event at Hillsborough

The IFST (Institute of Food Science and Technology) LaunchPad event supports food science students by providing them with access to expertise from those working within the food sector, and to help students shape their early career thinking. The NI event took place at AFBI Hillsborough on 07 November and was attended by the Queen's second year food group. Speakers and mentors on the day included a number of graduates from the Queen's food programme including Dominic Darby (Titanic Consulting), Vanessa Fursden (Marks and Spencer - Food Technologist), David Stewart (NPD Technician at Mash Direct), Michael Bell (Director, NI Food and Drinks Federation) and Declan Ferguson (Technical Director at Finnebrogue).

Mark Gallagher, Careers Adviser at Queen's School of Biological Sciences added, "The students feedback very positively about the Launchpad event each year and we now include the event as part of our semester one schedule to support our food undergraduates in their search for placement. These inputs from industry experts help bring actual jobs and career areas to life for the students".

The day began with presentations from the mentors on areas including 'Early career perspectives' and 'Standing out from the crowd' aimed at helping students when engaged in recruitment processes. Following that, students were then able to ask questions in the open discussion that followed. A speed-dating industry mentors lunch was also a key feature of the LaunchPad event and during this students had the opportunity to move from table to table, each hosted by an industry mentor to discuss topics including working for large and small organisations, working in enforcement, food-science and technology careers in retail and employer expectations of graduates.



Radical start-ups pitch to agri-food 'giants' in shared-innovation event

Some of the most imaginative and radical food start-ups from all over the world were selected to attend the Institute for Global Food Security on Wednesday 21 November to pitch whacky and wonderful ideas to a panel of multinational retailers at the Open Innovation Forum, an event dedicated to sharing ideas.

Robots capable of arable farming; a vending machine that produces 'personalised' smoothies from fresh fruit and veg (not pre-prepared juices) and ordered from a smartphone; food labels that indicate when a product has begun to spoil; and the 'world's first 3D candy printer' are just a few of the 20 'blue sky' concepts which were run past a panel of experts.

Some of the entrepreneurs – such as *Durrow Mills*, an Irish company producing 'more easily digestible, sprouted' flours – are already trading commercially, while others – for example *HigherSteaks*, a team creating 'in vitro meat' (meat created in the lab from stem cells) – are at an earlier stage of research and development.

Local SMEs who made the final cut to pitch to agri-food giants including PepsiCo, P&G, Siemens, Mars and Heineken, included *Food Safe System*, the brainchild of Newry chef Neil Bradley. The former proprietor of upmarket eatery Copper, Bradley created an app to help restaurateurs cut through red tape and comply with food-safety legislation.

A significant number of other 'pitchers' will also showcase how technology – from nanomaterials to blockchain to spectrometry – can benefit food safety and bio-security. Another Northern Irish company, *Zero Waste Biotech*, demonstrated a model for converting food and other organic waste on-site into biomass, and all within 24 hours.

A 'Dragon's Den'-style session took place on the second day of the Open Innovation Forum (OIF), an annual event organised by the Institute for Manufacturing at Cambridge University. The OIF was



originally created to offer a programme of structured support and opportunity for companies from all stages of the Food and Fast-Moving Consumer Goods value chain.

Open Innovation is a concept which originally emerged in California, whereby businesses opt for sharing knowledge around R&D in an effort to progress each other and the whole sector. In a world of widely distributed knowledge, a rapidly changing marketplace and recent challenges and uncertainties like Brexit, the idea is that companies can no longer afford to rely entirely on their own research, but should work collaboratively.

Stephane Durand, Manager of the Agri-Food Quest Competence Centre, which links more than 30 leading Northern Ireland agri-food businesses with top scientific researchers at Queen's, Ulster University and AFBI, said it was a unique chance for local start-ups to network and get noticed by multinationals. He said: "This is a very exciting event and a rare opportunity for SMEs to get direct access to some of the world's leading companies. The fact that IGFS at Queen's is hosting Day 2 of the OIF is testament to the creativity and dynamism in this space in Northern Ireland. For our own local companies, this session will be an invaluable prospect; who knows what connections and synergies could be made and where that could lead to for the NI agri-food sector as a whole?"

Image courtesy of the Institute for Manufacturing, University of Cambridge

World Mycotoxin Forum coming to Belfast

The World Mycotoxin Forum and the IUPAC International Symposium on Mycotoxins proudly announce that their next joint conference will take place in Belfast, Northern Ireland, on 14-16 October 2019.

WMFmeetsIUPAC2019 is the joint event of the 11th Conference of The World Mycotoxin Forum® and the XVth IUPAC International Symposium on Mycotoxins is the world's largest conference focusing on mycotoxins. The conference offers a unique platform for the food and feed industry, science and regulatory authorities to exchange current knowledge, to promote harmonisation of food and feed safety regulations and control procedures, and to make recommendations for integrated strategies ensuring the safety and security of food and feed supply chains.

The conference will be chaired by Professors Rudolf Krska and Chris Elliott.

For more information click here..



Queen's collaboration receives £5M to enable 100 doctoral students

Queen's University Belfast and The University of Aberdeen are bringing together their environmental research and teaching centres of excellence to deliver a unique PhD opportunity for 100 students. The students will be based both in the School of Natural and Built Environment and School of Biological Sciences.

The two universities officially launched the programme, Queen's University Belfast & University of Aberdeen Doctoral Research and Training (QUADRAT), at an event in Edinburgh on 21 November 2018.

The partnership has received £5M from the Natural Environment Research Council matched by the universities to create the posts, which will equip students with the skills, outlook, purpose and holistic understanding to lead, communicate and translate innovative cross-disciplinary research that meets the challenges associated with the sustainable management of the natural environment.

Professor Mark Emmerson, from the Institute for Global Food Security and School of Biological Sciences at QUB said: "Queen's is committed to tackling global challenges. Managing sustainability is one of the most challenging and rapidly growing areas in both the public and



private sectors. This partnership initiative with Aberdeen and NERC will improve both interdisciplinary academic training and research to enable the next generation of world leading scientists to work with industry and policy makers to shape their goals, and, ultimately drive towards positive environmental change."

Dr Jennifer McKinley, Reader from the School of Natural and Built Environment at Queen's University Belfast commented: "Queen's University is delighted to work in partnership with the University of Aberdeen and NERC to deliver this unique PhD opportunity for 100 students here in Belfast and Aberdeen. We are well placed

to embrace and champion the sustainable development goals embedded in NERC throughout research objectives, training and partnerships both within the UK and internationally."

Successful applicants will receive "T-shaped" training, whereby they develop disciplinary excellence around a specific research project but also gain a breadth of knowledge and a diverse, transferable skills base to ensure that they are competitive as research leaders across a range of career paths, be that inside or outside science or academia.

Inaugural IGFS Staff Networking Event focuses on Nutrition

IGFS hosted a Staff Networking Event in the Canada Room on 14 September with a special focus on Nutrition to welcome a number of new recruits across the Schools of Biological Science; and Medicine, Dentistry and Biomedical Sciences.

The following new staff, who are all involved in the Nutrition research area, gave presentations to colleagues to outline their specialisms:

- **Dr Emma Allott** specialises in research on fats and their impacts on prostate cancer
- **Dr Danielle McCarthy** is a nutritionist who has worked with Sainsbury's and GlaxoSmithKline
- **Dr Anne Nugent's** focus is national food-consumption databases and what they can tell us about the relationship between diet and health

- **Dr Qiaozhu Su** studies gut health and the human microbiome and the role of diet in the same
- **Dr Laura McGowan** is a psychologist who studies behaviour-change interventions to improve nutrition and has particular interests around the health of new mothers and mums-to-be; and obesity
- **Dr Claire McEvoy** was unable to be at the event, but an overview was given of her area. Claire is a dietitian and epidemiologist, who researches healthy ageing and prevention of chronic disease

The event was the first of its kind and was a great success, with lots of networking after the presentations in the refreshments area. Similar events will be held in the New Year to keep colleagues up to date with research and recruitment in the Global Food Integrity and Farms Of The Future areas.



Pictured, clockwise from top right, Dr Anne Nugent, Dr Laura McGowan, Dr Claire McEvoy and Dr Emma Allott.

IGFS hosts interdisciplinary workshop: 'Broader perspectives on animal contests'

Contest behaviour is a fundamental aspect of animal biology, with a resurgence of interest in the topic in recent years that includes implications for the welfare and husbandry of farmed animals. The Association for the Study of Animal Behaviour (ASAB), together with funding from the MHLS conference support fund sponsored an interdisciplinary workshop highlighting the importance of animal contest research, hosted at Riddell Hall, QUB. Organised by **Dr Gareth Arnott** from IGFS and the School of Biological Sciences (QUB) and Dr Sarah Lane (University of Plymouth), the aim was to foster interdisciplinary collaboration and knowledge-transfer between scientists studying different aspects of agonistic behaviour.

The workshop began with a plenary from Dr Dayu Lin (NYU), who discussed the neural circuits of aggression. By activating certain brain regions in mice, Dr Lin and colleagues can induce aggressive behaviour, even towards an inanimate glove. Her talk focused on whether this was a stereotypical sequence (fixed action pattern) or reflected an increased urge to attack (aggressive motivation). The range of techniques employed and their insights into the proximate mechanisms that underpin contest behaviour were impressive.

Prof. Mike Mesterton-Gibbons (FSU) delivered the second plenary, on modelling three-way contests. These triads offer a tractable system, which can often be applied to natural behaviours. In particular, Prof. Mesterton-Gibbons discussed the circumstances favouring coalition-formation in baboon communities and whether fiddler crabs should help their neighbours in fights against intruders. The audience appreciated being led through these examples step-by-step and Prof. Mesterton-Gibbons succeeded in making a difficult topic accessible.

Other talks covered diverse topics. Dr Alexandre Palaoro's (USP) meta-analysis of the functional properties of weapons was thought-provoking; I had not previously considered the distinction between armaments used as extensions



of body strength ("pushing weapons") and those which serve as self-contained agents in fights ("biting weapons"). It was also pleasing to hear so much about the oft-neglected invertebrates. Dr Marlène Goubault and Anthony Mathiron (both Univ. Tours) discussed factors influencing aggressive behaviour and contest outcomes in parasitoids, whilst Danielle Edmunds (Univ. Oxford) spoke engagingly about the influence of biased sex ratios on aggression in *Drosophila*. The day was rounded off with a drinks reception and dinner at Riddell Hall.

The second day started with the final plenary. Prof. Yuying Hsu (NTNU) talked about winner/loser effects: the tendency of previous contest winners to be more successful in subsequent fights and previous losers to be less successful. In a series of contest trials with fish, Prof Hsu and colleagues found that physically interacting individuals exhibited the expected winner-loser effects. However, this finding was reversed for fish separated by a mesh barrier, with previous losers more aggressive and previous winners less aggressive, suggesting that subjects in the mesh treatment were matching their opponents' behaviour. This talk, and the debate it provoked, highlighted important methodological considerations for contest experiments.

Later in the day, delegates enjoyed a series of talks on the applications of contest theory. In a fascinating insight into human

contest research, Dr Michael Brock (UEA) discussed how competition can encourage eco-friendly habits in students. His effort to link these findings to animal behaviour was a brilliant example of facilitating knowledge-transfer between disciplines. Three PhD students, Jennifer Weller (QUB), Rachel Peden, and Simone Foister (both SRUC), also discussed aggression in domestic pigs, demonstrating the importance of contest research for animal welfare. Finally, Prof. Ian Hardy (Univ. Nottingham) outlined his lab's studies on parasitoids in the context of real-world issues, such as the efficacy of releasing different biocontrol agents. These talks were important reminders of the applied benefits of research on agonistic behaviour.

The organisers would like to thank FMHLS at QUB and ASAB for funding the workshop and participants for the calibre of presentations. The audience learnt a lot and came away with many new ideas for their research, as well as new contacts and potential collaborators, with delegates having travelled from as far as Brazil, USA, Singapore, France, Portugal, and Taiwan. In addition, a group of researchers from the USA are keen to host a similar event in the future, so hopefully it will become a regular forum to bring together researchers studying this topic.

This article was written by PhD student Mr Andrew Crump.

Biological Sciences work placement students making their mark with local agri-food and animal health companies



Kathryn Holden (BSc Zoology with Professional Studies) – Placement host Kersia (Kilco Animal Health)

I am currently completing my professional studies year with Kersia (Kilco) International, a company at the forefront of animal health within the agricultural industry. They do this by producing an innovative range of products which improve hygiene standards and biosecurity. Kersia (Kilco) pride themselves on having an on-site Functional Chemical Research Centre based at Newtownabbey which is continuously researching and developing a wide range of products, while maintaining and improving the standards of their current products. I am currently a Technical Associate within this centre and this role includes completing quality checks on current products and assisting the team to continually develop new and existing product ranges. While completing my placement with Kersia (Kilco) I have thoroughly enjoyed working as part of the team and have greatly benefited from this role as it has allowed me to further develop laboratory skills I have obtained from university and put them into practice in a working environment. I feel that I also now understand some content within my course to a greater degree, as I am putting the knowledge I have obtained into action and can make a better connection between my course and how it can actually benefit me within a career. Not only have my scientific skills and knowledge benefited from being on placement but my appreciation of social skills within a working environment has improved, as I can really see how the quality of my work can benefit from a role within a team and this gives me an insight into a broader range of knowledge.



Callum O'Neill (BSc Food Quality, Safety and Nutrition with Professional Studies) – Placement host Linwood Foods)

My placement is based at Linwood's, Co Armagh, a diverse company consisting of three parts; bakery, health foods and also as an ingredients supplier. The organisation is very forward thinking and innovative, and always seeking out new ideas or changes which can improve products or develop new ones, which is great for me in my role as a New Product Development Technologist. In my position I am involved in developing concept samples and recipes, conducting taste tests and running factory trials for the scaling up of projects, as well as conducting research on upcoming trends or foods within the industry. I am enjoying the role thoroughly, as it is a very varied job, with no two days being alike. There are many challenges associated with starting new projects, and whilst this can be frustrating at times, it is very rewarding to find a solution which works and can be used in the production process – making me feel like I am really contributing to the company. This involves a lot of trial and error, and learning what does not work is as important as learning what does which I feel is valuable experience for me going forward both this year and beyond.



Aaron Jones (BSc Agricultural Technology with Professional Studies) – Placement host Chestnutt Animal Feeds

Situated in the heart of North Antrim, Chestnutt Animal Feeds is a family run mill, with a lifetime of experience in providing a wide range of quality ruminant feeds and technical services, helping to optimise livestock health and performance. Upon commencing a year-long placement, I have undertaken a variety of roles within the business, allowing me to both broaden my knowledge of ruminant nutrition and gain exposure to aspects outside that of my Agricultural Technology degree.

Forage analysis has formed a large proportion of my daily tasks; this involves the collection of samples on farm and testing using the latest NIR technology. Through providing farmers with a nutritional breakdown of their fodder, rations can be formulated accordingly, helping to fulfil each animal's genetic potential in an efficient and economic manner. During my time I have also been entrusted with the upkeep of company's website; publishing informative articles on silage quality and influencing beef cattle performance to date. Most recently I have been introduced to ration formulations, using the Ultramix software. Though often challenging, with many variables from farm to farm to overcome, it is an enjoyable task and a skill set I hope to further develop over the remainder of my placement.

Is your business interested in recruiting a work placement student?

If your organisation currently offers, or would like to offer work experience to any of our students please contact **Mark Gallagher** (School of Biological Sciences Careers and Work Placement Consultant) at m.gallagher@qub.ac.uk

Professor Nigel Scollan was invited to China by the College of Grassland Agricultural Science and Technology of Lanzhou University and the State Key Laboratory of Grassland Agro-ecosystem. Professor Scollan and his party visited the Loess Plateau to assess grass and livestock models, visited Wanzi Qianhong Forage Industry Co. Ltd., Hongli Agriculture and Animal Husbandry Technology Development Co. Ltd., and local farmers, entrepreneurs and government administrators.

Wang Kejian, member of the Standing Committee of Huining County Committee and secretary of the county party committee, and Li Tong, member of the Standing Committee of the County Party Committee, deputy secretary and organisation minister, met with Professor Scollan and his party. He Xiongyu, a researcher at Massey University in New Zealand, Niu Jun, director of Huining County Animal Husbandry Bureau, Professor Hou Fujiang from the College of Grassland Agriculture Science and Technology, and PhD student Juan, participated in the study.

During the visit, Professor Scollan made a speech entitled “Livestock production,” and spoke on the relationship between livestock production, greenhouse gas emissions and global food safety and future development trends, and conducted in-depth discussions with teachers and students. Professor Hou Fujiang presided over the report. The two sides also

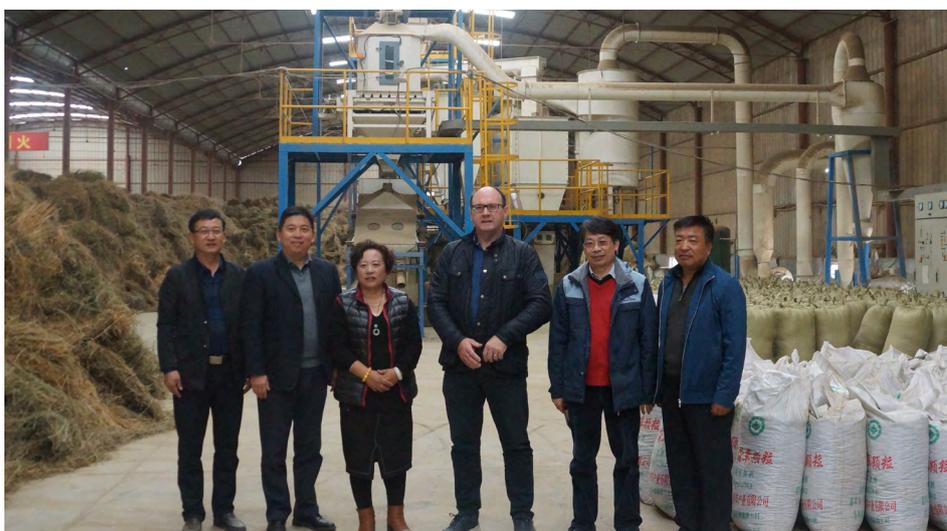


discussed issues such as research and teaching cooperation.

Professor Niamh O’Connell was invited by Compassion in World Farming (CIWF) to speak on broiler chicken welfare at the 2nd World Conference on Farm Animal Welfare in Beijing in October. The conference was hosted by the FAO and the China Association for the Promotion of International Agricultural Co-operation, and CIWF was one of the co-hosts. This follows a number of years of Niamh and her team working closely with the UK broiler industry to help develop new types of environmental enrichment for commercial housing. Niamh discussed the effects of natural light and of other types of environmental enrichment on broiler chicken health and welfare, and also emphasised the importance of ‘seeking the animal’s opinion’ in environmental design through use of preference tests.

Microbiology Society visits the School of Biological Sciences

The School of Biological Sciences recently hosted a visit from Tasha Mellins-Cohen, Director of Publishing with the Microbiology Society. Tasha was on site promoting an opportunity to students on the Microbiology Professional Studies programme to undertake a placement with the Society working as an Editorial co-ordinator. The Microbiology Society Annual Conference 2019 takes place between Monday 8 April – Thursday 11 April and will be held at the ICC Belfast (formerly Belfast Waterfront), UK. It is expected that over 1400 delegates will attend in what is the of the UK’s largest annual gathering of microbiologists annually. Further information can be obtained by contacting conferences@microbiologysociety.org



Commenting on the visit, Tasha Mellins-Cohen said “I visited QUB to introduce the Microbiology Society’s new professional development opportunity for undergraduates, through which we are offering 1-year placements in the Society’s publishing team. The students were kind enough to give up their lunch break to hear me speak, and I was impressed with the standard of their questions about both the Society and the placement. I look forward to one of them joining my team.”

IGFS welcomes ISO delegates to Queen's University Belfast

The Institute for Global Food Security was pleased to welcome the ISO TC34 subcommittee to Queen's University Belfast and host their meeting on the 19th and 21st of September 2018. The event was kindly sponsored by IGFS/QUB and FOSFA.

Dr Tassos Koidis from IGFS and the rest of the UK delegation (Dr Gretel Bescoby, FOSFA, SC1 Secretariat and Andrew Damant) acting on behalf of the British Standards Institute (BSI), defended the UK's position on various topics of official analytical methods of oils/fats. For information, ISO/TC34/SC11 deals with 'Animal and vegetable oils and fats' and ISO/TC34/SC2 deals with 'Oleaginous seeds and fruits and oilseed meals' operating under the TC 34 (Food products).



The participation was one of the largest ever with some 42 delegates in total from Canada, France, USA, Italy, United Republic of Tanzania, Switzerland, Australia, China, Germany, Spain, Hungary, The

Netherlands, and the International Olive Council.

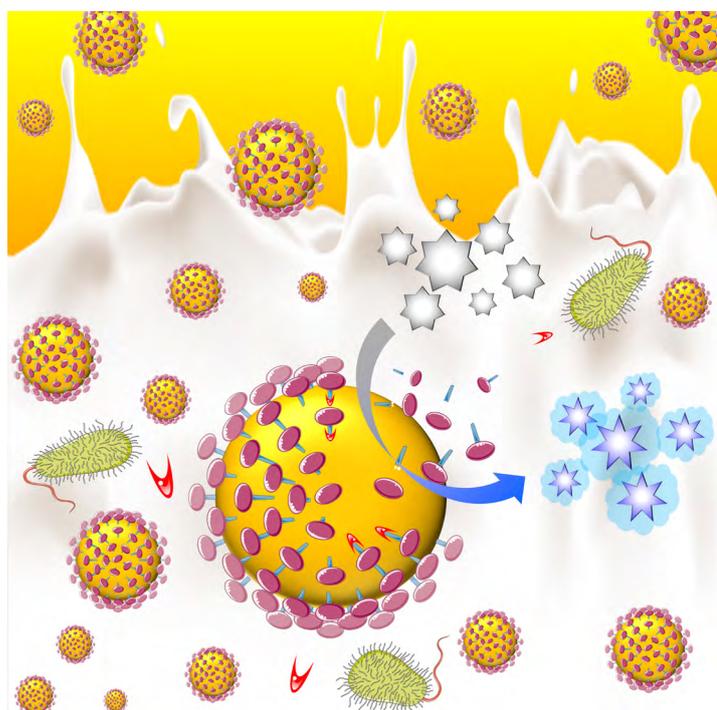
Next meeting will held in March 2020 in Sydney, Australia.

IGFS protease detection research featured in Nano Research

The involvement of proteases in all life functions has highlighted their crucial role in the progression of many diseases and in microorganism growth. Conventional methods for protease detection are slow, lack the sensitivity required for low level detection, and cannot be utilised on-site. These limitations hinder the applicability of these assays to provide an early indication of food spoilage, infection and disease state.

With the need to overcome these limitations, Dr. Cuong Cao's research group developed a simplified approach utilising the properties of gold nanoparticles (AuNPs). The results highlighted a sensitive, fast and cost effective nanosensor for protease detection in milk and urine. This work has recently been published as Gold Open Access in Nano Research, one of the leading journals in materials science and multidisciplinary research.

To create the nanosensor, the investigators first determined that under predefined conditions AuNPs were able to mimic the behaviour of natural enzymes, i.e. the peroxidase enzyme that can speed up the oxidation of tetramethylbenzidine to produce a blue coloured product which is clearly visible via the naked-eye. Interestingly, the investigators also found that this behaviour could be tuned to suit the intended application.



In order to develop this finding into a protease detection approach, the AuNP surface was coated with casein (a protein present substantially in milk) which suppressed the enzyme-mimicking behaviour by 77.1%. This decrease was due to the casein molecule blocking surface reactions, meaning the reactions happened much slower (no vivid blue colour formation). Significantly, casein also acted as a substrate for protease digestion, resulting in its removal from the AuNP surface and subsequent vivid blue colour formation due to the recovery of enzyme-mimicking behaviour.

Using this approach, results can be obtained within 90 minutes without complicated or expensive read-out equipment. The method was applied to milk and urine analysis showing promise as a food safety and disease screening tool. Importantly, coating the AuNP surface with different molecules has the potential to expand the detection capabilities beyond that of proteolytic enzymes.

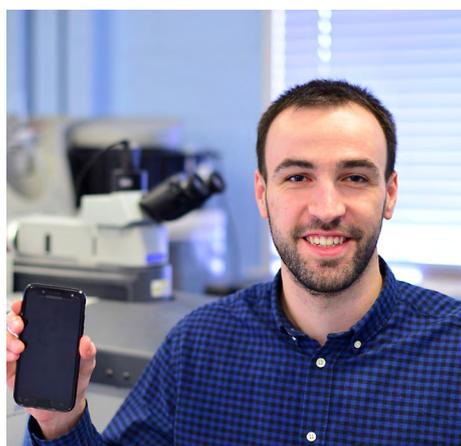
IGFS-based FoodSmartphone Early Stage Researchers share their opinions on future technologies for food safety analysis



Yunfeng Zhao

My job here at IGFS is mainly focusing on developing signal processing and secured data transmission solutions for the FoodSmartphone project. There are many ways to achieve such smartphone-based biosensing for food analysis nowadays, including but not limited to optical, bioelectrical, and mass-based methods. Our research starts with optical methods. That is, the biosensing methods that use light as their sensing media. What advantages do optical methods have in general? The first one that comes into my mind is their non-destructiveness and rapidness. To make an analogy, we can diagnose our health condition by simply taking an X-ray image of our body without doing a surgery. Similarly, food quality can be assessed using near-infrared or infrared light scanning without the necessity to open or destroy the food sample. Another advantage of optical method is its simplicity. Light is one of the most fundamental elements of our universe, and its characteristics are well studied. And almost every smartphone today has an optical camera integrated, making them ideal platforms for optical biosensing. Moreover, we can not only analyse what chemicals exist in the food, but also where they are located through advanced optical imaging by taking advantage of the fine resolution brought by the high-quality smartphone cameras today.

Continue reading Yunfeng's article by clicking here



Javier Lou Franco

“What can't be done with any of our smartphones these days?” That's what we all wonder in light of the recent advances we all observe. That's also what brought together a group of scientists who have embarked on a journey to combine smartphones and food safety analysis. As a member of the ambitious FoodSmartphone project team, our main aim is to develop smartphone based biosensors to detect multiple contaminants in food such as toxins, pesticides, microorganisms and allergens. The day when a smartphone can be used as a diagnostic tool by non-trained people is thus perhaps not so far away! It might look a futuristic idea, but this is a European research project that is now up and running, with QUB playing an important role. In total 11 early stage researchers have joined various teams in different European universities and companies to make this possible in a 3 year time period. The approaches being studied at the moment are as diverse as the team members' backgrounds: enzymatic assays, plasmonic sensors, electrochemical sensors, etc., taking some of the advantages of gold, fluorescent or carbon nanoparticles to exploit their optical properties. Moreover, an early stage researcher from QUB focuses on image analysis and the computational aspect of the work, ensuring that the bioassays developed by other members of the group can be perfectly integrated into a smartphone.

Continue reading Javier's article by clicking here



Jordi Nelis

It's been one year since I joined the project so, with two years ahead, I feel confident to talk about what can be achieved within my particular project. The research I'm doing at the Institute for Global Food Security is split up in the same way as biosensors are: biorecognition element and signal transducer. My project aims to detect spoilage microorganisms in dairy products through a smartphone based sensor. These microbiological contaminations cause important economic losses, as any food batch contaminated will be quickly spoiled and must be discarded. In the event of finding pathogenic bacteria present in the food samples, the problem becomes even more serious, potentially threatening the consumer's health if the contamination is not detected in time. For example, Mycobacterium bovis can spoil milk and dairy products made from raw milk, such as cheese and yogurt. More importantly, if the contaminated dairy products are consumed, consumers will be infected with Mycobacterium bovis which is also one of the causal agents of human tuberculosis. So far I have been trying to optimize the signal transduction of the sensor, using gold nanostars.

Continue reading Jordi's article by clicking here



FoodSmartphone (H2020-MSCA-ITN) is a project that has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 720325.



FoodSmart
phone.eu

Staff and Student News



Dr Cuong Cao is hosting an exchange PhD student, **Mr Bhaskar Das** (pictured above), from the National Institute of Technology Rourkela, (India) for one year. Mr Das is working on a project entitled “Biogenic synthesis of metal and metal oxide nanocomposites for biosensing pathogens”, funded by the Commonwealth Fellowship Split Site Exchange Program. Within this project he is researching on the development of paper based microfluidic biosensors for the detection of food and waterborne pathogenic bacteria using biologically synthesized metal and metal oxide nanocomposites.

Professor Chris Elliott and **Dr Katrina Campbell** were recognised at the Visit Belfast Ambassador Awards for their work on bringing the World Mycotoxin Forum to Belfast in 2019. The annual Ambassador Awards form part of the Belfast Ambassador Programme which is led by Visit Belfast and supported by Belfast City Council, Tourism Northern Ireland and Invest Northern Ireland to enlist the support of local industry leaders who can help bring national and international conferences and events to Belfast.

For information on how VisitBelfast could support you in securing a conference for Belfast please contact **Michael Hills** at m.hills@qub.ac.uk

Dr Lisa Connolly has been successful in a recent grant application. Entitled **FREIA** (Female Reproductive toxicity of EDCs: a human evidence-based screening and Identification Approach) the €6.2m Horizon2020 project involves 11 international partners that are expert leaders in the area of endocrine disruption and human health. The consortium aims to close gaps in scientific knowledge on the mechanisms by which endocrine disrupting chemicals can affect female reproduction during specific life stages and will provide test methods to address this. The project is due to commence work in January 2019.

Recent Publications

A number of staff were involved in the publication of a paper in Nano Research entitled ‘**Unusual switchable peroxidase-mimicking nanozyme for the determination of proteolytic biomarker**’. The paper’s authors are **Claire McVey, Natasha Logan, Nguyen T. K. Thanh, Christopher Elliott, and Cuong Cao**. *Click on paper title to view.*

Professor Niamh O’Connell and **Dr Mary Baxter** have had a paper entitled ‘**Does grouping environmental enrichments together affect the way they are used by commercially housed broiler chickens?**’ published in Applied Animal Behaviour Science. *Click on paper title to view.*

We’d would like to welcome the following new staff:

- Professor Helen Roche**
- Professor Gary Hardiman**
- Dr Jordi Ortuno Casanova**
- Dr Claire McVey**
- Dr Olufunke Akiyode**
- Ms Michaela Fox**
- Mr Matthew McGoldrick**
- Dr Ratnasekhar Ch**
- Dr Karen Siu Ting**
- Mr Ben James Thomas**

If you have an article, research announcement or staff/student news you would like to see featured in the next IGFS Newsletter then please email **Michael Hills** at m.hills@qub.ac.uk



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David Keir Building :: 18-30 Malone Road :: BT9 5BN

www.qub.ac.uk/igfs | igfs@qub.ac.uk | +44 (0) 28 9097 6514