Quadram Institute

Spring 2020

Quadram Institute
Science Health Food Innovation

Welcome to the newsletter of the Quadram Institute.

This newsletter comes to you at an incredibly difficult time for all of us across the world, as we face the challenges posed by the Coronavirus pandemic.

Members of the Quadram Institute team have put themselves forward at this critical time, and with colleagues across the Norwich Research Park have joined the global response from the scientific community.

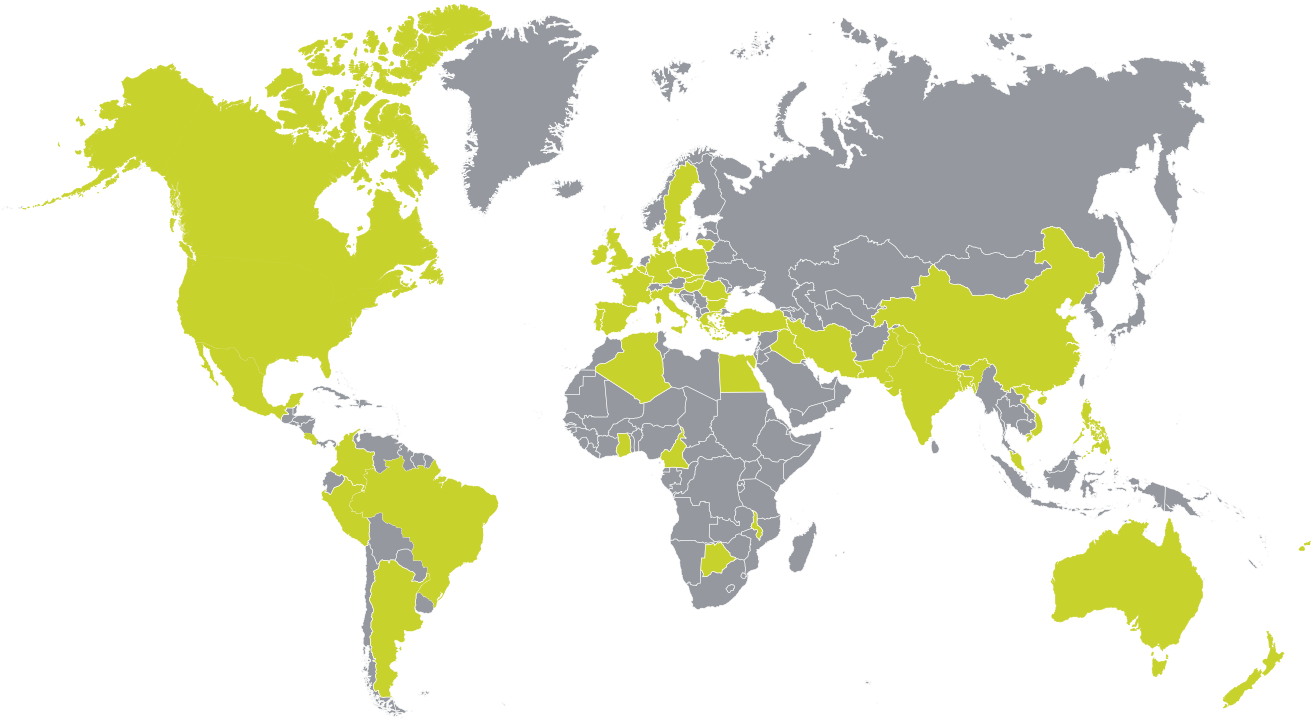
Volunteers from all of research organisations on the park are working together with staff at the Norfolk and Norwich University Hospital (NNUH) to help with the isolation and detection of viral RNA, part of the vital testing process of NHS workers. bit.ly/20A19

The combined bioscience expertise on the Norwich Research Park means that we have a pool of staff with exactly the right skills to assist the NHS. I am proud of all our volunteers and of our partners' collective response to this pandemic.

Justin O'Grady, Mark Pallen, Andrew Page and their teams are part of the National Genome Sequencing Alliance announced by the Chief Scientific Adviser, Patrick Vallance bit.ly/20A16

Simon Carding, with the Eastern Arc consortium, is developing a vaccine delivery approach based on engineering the natural ability of resident gut bacteria to generate nanoparticle sized Outer Membrane Vesicles (OMVs). We are currently looking for industrial partners to assist in scaling up and manufacture, and industry partners interested to use the engineered OMV as a vaccine delivery technology as well use of native OMVs as an adjuvant for other vaccine formulations. bit.ly/20A18

We are supporting the NHS and the global fight against the coronavirus pandemic in many ways, and I would like to thank publicly everyone involved, either working from home, or doing essential lab work.



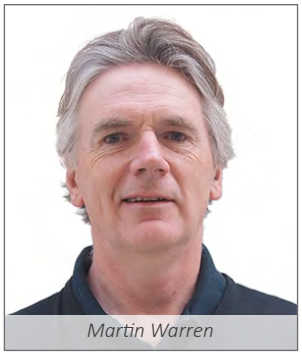
Our ambition at the Quadram Institute is to be world-leading in interdisciplinary food, microbial science and health research. Tackling global challenges requires a global approach. At the time of counting, we have people from 45 nations working together to improve human health and discover how food and the gut microbiome can help us all live healthier lives. I'm proud to be part of this international community.

As well as welcoming researchers and clinicians from across the world, we're working across borders to help enhance global health.

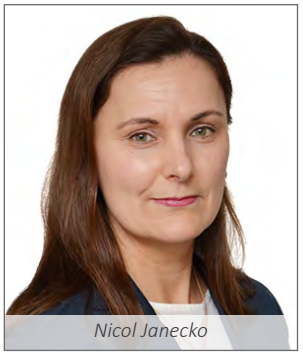
Epitomising this approach, QI researchers are part of consortia of leading experts brought together to uncover the survival secrets of *Salmonella*, supported by the Bill & Melinda Gates Foundation. Despite being a major source of infectious disease, much is still unknown about its biology, particularly how it persists in aquatic environments. The new projects will examine the environmental niches *S.* Typhi exploits to improve detections and control.

These projects are characterised by their use of cutting-edge genomics techniques and we continue to lead the development of new platforms with the release of TraDIS-Xpress. This allows the simultaneous assaying of all of the genes in a bacterial genome for roles in stress.

Martin Warren has been appointed as lead for our Food Innovation and Health Institute Strategic Programme. Martin has established his research group at QI studying biosynthetic pathways of complex small molecules such as vitamin B12. Martin's predecessor, Richard Mithen, has taken up the roles at the Liggins Institute of the University of Auckland and Chief Scientist for the New Zealand High Value Nutrition National Challenge. I'd like to thank Richard for his research contributions and his role in developing the Quadram Institute.



Martin Warren



Nicol Janecko

I'm also very pleased to welcome Nicol Janecko to the institute as a new group leader focusing on *Campylobacter* in the food chain.

Ian Charles, Quadram Institute Director

The partnership between bioscientists, clinicians from the Norfolk and Norwich University Hospital (NNUH) and researchers at the University of East Anglia (UEA) is critical to our mission to deliver healthier lives. The collaboration between Lindsay Hall's research group and Paul Clarke from the NNUH Neonatal Intensive Care Unit (NICU) and UEA's Norwich Medical School is an example of how this partnership is saving lives now and leading to future innovative treatments and diagnostic tools.

Giving billions of live bacteria to boost the gut health of premature babies

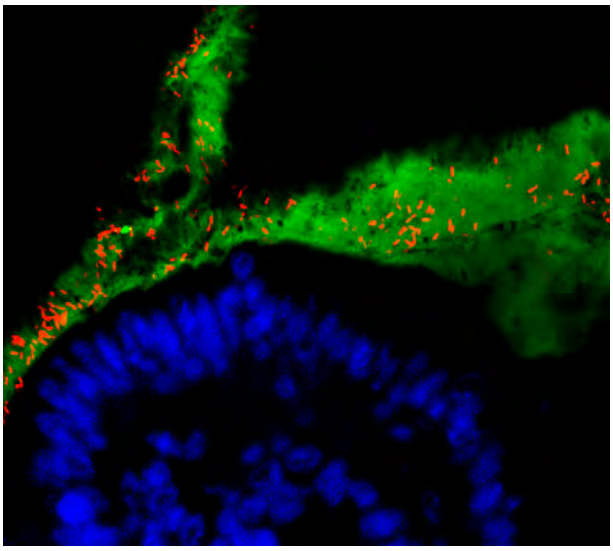
The NNUH became one of the first hospitals in the UK to introduce daily probiotics dosing for NICU babies on the back of growing evidence that adding live *Lactobacillus* and *Bifidobacterium* probiotic bacteria to milk reduces the number of cases of necrotising enterocolitis (NEC). A research report published by the team demonstrated how this may have helped halve the number of cases of NEC and sepsis, saving the lives of many vulnerable preterm babies.
bit.ly/QI20A01

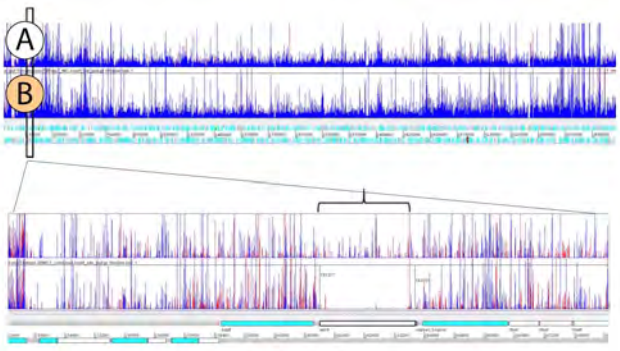
Diagnosing infections earlier in preterm babies with real time genomic analysis

Next generation sequencing techniques have been used to rapidly and reliably identify the microbes present in a preterm baby's stool sample that may cause life-threatening conditions such as sepsis or necrotising enterocolitis (NEC). The method, developed with colleagues at the Earlham Institute, also uncovers the presence of antimicrobial resistance genes.
bit.ly/QI20A02

Selfish strategy boosts bacteria's microbiome prevalence

Nathalie Juge and her group have uncovered a unique metabolic pathway that gives a key member of the gut microbiota a competitive advantage when colonising our bodies. As well as providing new information about the symbiotic relationship we have with our gut bacteria, uncovering this pathway may also provide new targets for biomarkers or therapies for conditions linked to imbalances in the microbiota.
bit.ly/QI20A03





New sequencing platform uncovers genomic adaptations to common household antibacterial

A team of researchers led by Ian Charles and Mark Webber have developed a new genetic sequencing platform. TraDIS-Xpress simultaneously assays all of an organism's genes, identifying those that are essential for growth and those whose up-or down-regulation promotes or inhibits growth under different stresses. TraDIS-Xpress was deployed to shed light on how bacteria become sensitised or resistant to the common household antibacterial triclosan, finding previously unidentified genes of interest. TraDIS-Xpress could be of great use in other studies into bacterial adaptation to stressful environments, and a video has been produced to explain how it works.
bit.ly/QI20A04
bit.ly/QI20A04-video

International collaboration targets *Salmonella* Typhi

Salmonella Typhi, the organism behind typhoid fever, remains a serious global health threat. Its transmission relies on surviving in different environments, but how it adapts to exploit niches isn't fully understood. With better knowledge of the genetic basis of its adaptations, we can develop targeted improvements to sanitation to reduce transmission and ultimately the burden of the disease on strained healthcare systems. To achieve this, the Bill & Melinda Gates Foundation launched a Global Grand Challenges Exploration, and QI researchers are part of several international groups to receive support.

Gemma Langridge and Alison Mather will investigate the impact of genome rearrangements on *S*. Typhi survival in water from high and low endemic regions in Fiji. As well as providing a better understanding of this adaptation, this project will also address the significant challenge that *S*. Typhi cannot be cultured from water, hampering monitoring. Gemma Langridge and John Wain are also involved in a project investigating the persistence of *S*. Typhi in aquatic environments in Madagascar.
bit.ly/QI20A05

Rob Kingsley is working with colleagues from the National Microbiology Reference Laboratory in Harare, Zimbabwe, to investigate the association between *S*. Typhi and minute single cell organisms called protists. The project will collect samples from areas with reduced drinking water quality and use sequencing techniques to study interactions between *S*. Typhi populations and protists to identify how survival strategies may have evolved.
bit.ly/QI20A06

FOLIUM Science and Quadram Institute join forces in the fight against antimicrobial resistance

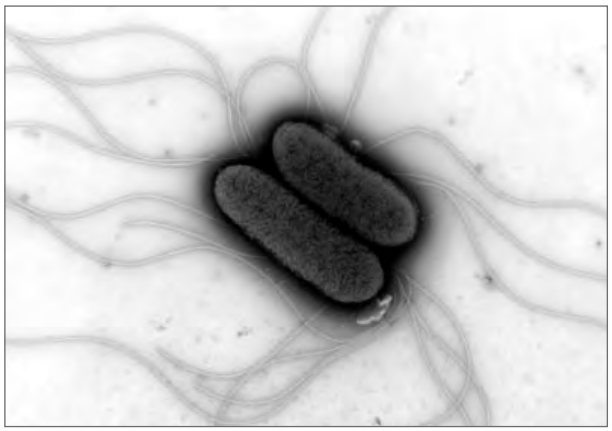
Rob Kingsley and FOLIUM Science have worked together on an Innovate UK-funded project aimed at reducing pathogen contamination in livestock rearing. FOLIUM Science has developed unique technology, called Guided Biotics™, that can selectively remove undesirable and pathogenic bacteria from the food chain. The new collaboration is using bioinformatics to evaluate and optimise targeting of Guided Biotics™ to *Salmonella*.
bit.ly/QI20A07

Developing gut cell network analysis to understand intestinal diseases

Tamas Korcsmaros led a team from QI and the Earlham Institute applying network analysis to organoids grown from human gut lining cells, to better understand how the gene interactions that preserve the health of the gut lining. Organoids are a good model for understanding these complexities as they consist of different interacting cell types.
bit.ly/QI20A09

Salmonella – how the body fights back

Quadram Institute scientists have contributed to new research led by the University of East Anglia that shows how the human body powers its emergency response to *Salmonella* infection. It is hoped that the findings could help form new approaches to treating people with Salmonella and other bacterial illnesses.
bit.ly/QI20A08



New pork nutrient data reflects pig production changes

Fat levels in UK pork have dropped, QI's Food Databanks team have revealed, in the first official testing for nearly 30 years. The study was co-funded by AHDB and Public Health England and the results reflect production changes including new breeds, changes in diet and supplementation, and newer cuts like pork medallions.
bit.ly/QI20A10

UK Charity Pledges £500,000 for Research into ME in Norwich Research Park

Invest in ME Research is pledging £500,000 for continued research into the disease myalgic encephalomyelitis (ME). The funding will go towards a Faecal Microbiota Transplantation (FMT) clinical trial into the links between ME and the gut microbiome. At a public event, researchers sought input from people with ME to refine the trial design. Talks from the event are now available online
bit.ly/QI20A11
bit.ly/QI20A11-video

£100K award from Breast Cancer Now to study whether gut bacteria could help prevent spread of breast cancer

Breast Cancer Now, the research and care charity, have provided new funding to investigate whether gut bacteria can be manipulated to prevent the spread of breast cancer.
bit.ly/QI20A12

Lindsay Hall receives research accolade

Lindsay Hall has received the Wain Medal from the University of Kent. The accolade is given to an outstanding UK-based young scientist doing research in biochemistry.
bit.ly/QI20A14

Quadram Institute is partner in important new funding for bioscientists of the future

The Norwich Research Park Biosciences Doctoral Training Partnership (NRPDTP) has been awarded £12 million to train the next generation of bioscientists. The funding award means the NRPDTP will be able to offer at least 32 PhD studentships per year for the next five years. The NRPDTP is one of 12 successful partnerships announced as part of a £170 million award from BBSRC, part of UK Research and Innovation.
bit.ly/QI20A13

Lindsay Hall

Alison Mather recognised for AMR research with Emerging Leaders Prize

Alison Mather has been recognised at the Medical Research Foundation's third annual Emerging Leaders Prize, that celebrates outstanding scientists who are making a significant impact in the fight against antimicrobial resistance (AMR).
bit.ly/QI20A15

Alison Mather

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