

# Science + Innovation

Issue 2 / 2011



*Professor Richard Mithen*

## IFR research leads to UK launch of Beneforté broccoli

A new variety of broccoli with higher levels of a key phytonutrient is now available in UK shops thanks to experts working on both the biology of plants and the link between human nutrition and health.

“Our research has given new insights into the role of broccoli and other similar vegetables in promoting health, and has shown how this understanding can lead to the development of potentially more nutritious varieties of our familiar vegetables,” said Professor Richard Mithen, of the Institute of Food Research. “Now there will also be something brand new for consumers to eat as a result of the discoveries we have made.”

Minister for Universities and Science David Willetts said: “This is a fantastic achievement and testament to the quality of research we have in this country and its ability to drive growth. This excellent work has led to the development of a highly commercial food product that will be both grown and sold in the UK, giving a real boost to agriculture, our personal health and the economy.”

## From food waste to fuel in 6 days

George Freeman MP, chair of the All-Party Parliamentary Group on Science and Technology in Agriculture has officially opened the Biorefinery Centre at IFR, where scientists will explore new ways to make use of residual plant material from food processing and agriculture. At the heart of the centre, which was funded by BBSRC and EEDA, is a steam explosion pilot plant used to blow apart plant cell walls to extract useful natural products.

“Once the food part of a crop has been exploited, there is a mass of plant material left behind that is often discarded as waste,” said Professor Keith Waldron. “With the launch of the pilot plant and through collaborations on the Norwich Research Park we have all the expertise necessary to help industry explore ways to make use of it.”

Commenting on the Centre, George Freeman MP said: “I am thrilled and excited by the developments at the Institute of Food Research and congratulate them on their new addition of a Biorefinery Centre. I have long been a supporter of our scientific potential in the East and this is another example of Norfolk’s world class potential.”



## Science Update

### Genome analysis will reveal how bacteria in our guts make themselves at home

Researchers from the IFR, led by Dr Nathalie Juge, and The Genome Analysis Centre have published the genome sequence of a model gut bacterium, *Lactobacillus reuteri* to help understand how these organisms evolved their symbiotic relationships with their hosts.

*Journal of Bacteriology* **193** (15) 4015-4016  
doi:10.1128/JB.05282-11

### Profiling wheat fibre

An analysis of the structural diversity of a principal component of dietary fibre, arabinoxylan, in different varieties of wheat has been carried out, enabling breeding programmes to better take account of this important but complex component. Understanding arabinoxylan can help explain how wheat grain fractures under conditions such as milling. Researchers led by Professor Clare Mills at the Institute of Food Research and colleagues at Rothamsted Research have used a variety of imaging techniques to characterise structural and spatial differences in arabinoxylan content, which could be used to breed improved varieties or produce natural healthier food ingredients.

*Journal of Agricultural and Food Chemistry* **59** (13)  
7075-7082 doi: 10.1021/jf201095m

### Nature reaches for the high-hanging fruit

In the first study of its kind, Dr Paul ÓMáille and co-researchers have used tools of paleontology to gain new insights into the diversity of natural plant chemicals. They have shown that during the evolution of these compounds,

found in plants like pepper, tomato, and potato, nature doesn't settle for the 'low-hanging fruit' but favours rarer, harder to synthesise forms, giving pointers that will help in the search for potent new drugs. Dr ÓMáille holds a joint appointment with the John Innes Centre.

*Journal of the American Chemical Society* **133** (32),  
12632-12641 doi: 10.1021/ja203342p

### Shedding light on proteins in the glass state

In a special issue of the European Journal of Pharmaceutics and Biopharmaceutics (EJPB) Dr Roger Parker and Dr Natalia Perez described new work which sheds light on the molecular basis of stabilising proteins in the glass state. The glass state of carbohydrates, polysaccharides and proteins is relevant to their processing behaviour in foods.

*European Journal of Pharmaceutics and Biopharmaceutics* **78** (2), 264-270 doi:10.1016/j.ejpb.2011.02.002

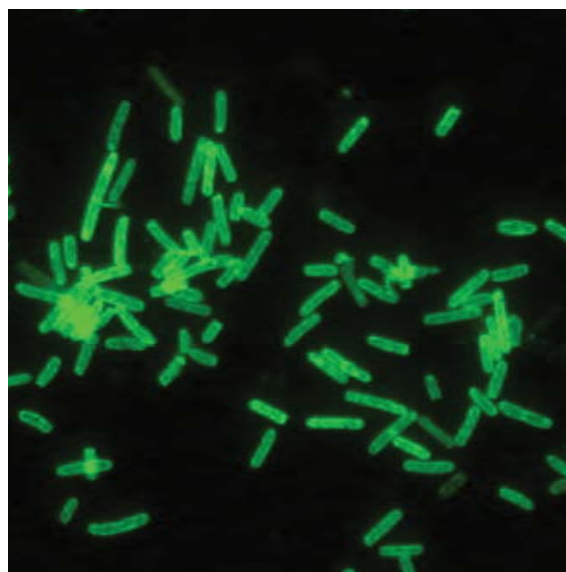
### Tuning natural antimicrobials to improve their effectiveness at battling superbugs

Dr Melinda Mayer and Dr Arjan Narbad have been exploring the use of virus-produced proteins that destroy bacterial cells to combat potentially dangerous microbial infections. New research is showing that it is possible to 'tune' these endolysin properties to increase their effectiveness and aid their development as a new weapon in the battle against superbugs.

*Journal of Bacteriology* **193** (19) 5477-5486  
doi:10.1128/JB.00439-11



George Freeman MP and Professor Keith Waldron at the opening of the Biorefinery Centre at IFR



The truncated endolysin, tagged with green fluorescent protein, bound to *C. difficile*. Image by Kathryn Cross, Imaging Partnership at IFR

## New Research

### Researchers to identify the secrets of *Salmonella*'s survival

Funded by BBSRC, Dr Arthur Thompson and Dr Fran Mulholland are to collaborate with the University of Sheffield to investigate how *Salmonella* survives during its lifecycle within our bodies, as a way of finding chinks in its armour that can be exploited to develop new therapies. *Salmonella enterica* serovar Typhimurium is the most common cause of food poisoning in the EU, and whilst efforts to prevent contamination continue, there is a clear need to develop new treatments to combat infection with *Salmonella* following ingestion.

### New project will test novel mechanisms to control satiety

A new research project being led by Professor Peter Wilde at the Institute of Food Research is to test in humans novel ways of trying to reduce appetite, as part of a strategy to combat the problems caused by obesity in the UK. In the laboratory, Prof. Wilde has already shown that it is possible to slow down fat digestion by coating fat droplets with plant lipids or enzyme-treated milk proteins, and the new project, with £750,000 funding from BBSRC, will apply these findings to human studies.



*Professor Peter Wilde, who will lead the satiety project*

## People

### Natural Food Biopolymers Meeting

IFR recently hosted a conference on food biopolymers, which helped to celebrate the lifetime contribution made to this field by Professor Vic Morris, who has recently retired. 'Natural Food Biopolymers: Structure and Bioavailability' brought together researchers who have worked or collaborated with Prof. Morris during his forty year career, along with post docs and students new to this field.

### Professorship for IFR scientist

Peter Wilde's 25 years at IFR have been rewarded with a Professorship from the University of East Anglia School of Pharmacy. Peter joined the Process Physics Department at IFR in 1985, following a degree in Biophysics at UEA. His main research interests have focussed on the properties of the molecular interfaces in food components. The aim has been to work out how the interfacial behaviour between these molecules can explain large scale behaviours, such as emulsion stability and foams.

### Science into Practice

### Cereal entrepreneur gets a taste of food research

Bill Jordan, founder of Jordan's Cereals recently visited the Institute of Food Research to learn about the work of the institute and the Food and Health Network. During his visit, Bill saw some of the IFR's latest work from the Plant Natural Products and Health Programme and took a tour of the new Biorefinery Centre. He also heard from other Norwich Research Park scientists working on cereals.



*IFR Director Prof. David Boxer presenting Prof. Vic Morris with an abstract book at the meeting to mark his retirement*

## IFR Extra at Colworth Science Park

Universities and Science Minister, David Willetts opened a new multi-million pound science and enterprise hub at Colworth Science Park in Bedfordshire, which is allowing IFR Extra to establish a presence alongside one of Unilever's global research centres and 19 other SMEs on site. Speaking at the official opening, David Willetts, Minister for Universities and Science, said: "To make the most of our world class research base we need to encourage close collaboration between the public and private sectors. This creates the right conditions to commercialise research – enabling businesses to work with universities to develop new products and break into new markets, boosting economic growth while helping to maintain our leading edge in science."

The Exchange has been made possible by the injection of £13.7 million by international property group Goodman and Unilever plc, with support from the Government through the East of England Development Agency (EEDA).

## Minister opens World Class Innovation Centre and hears about world-leading science

The Secretary of State for Business, Innovation and Skills, Dr Vince Cable, officially opened the Norwich Research Park Innovation Centre in the presence of regional business, political and scientific guests. Later, the Secretary of State saw aspects of the exciting science underway at NRP, where IFR was represented by Head of Innovations Dr Reg Wilson. Within the NRP Innovation Centre, he also toured the lab space of Model Gut, a business unit based on IFR science and a joint venture with Plant Bioscience Limited (PBL).



*Business Secretary Dr Vince Cable meets Dr Reg Wilson*

## International

### New International Manager for IFR

The International Office at IFR is pleased to welcome Gro Slotsvik to their team, who will be supporting collaboration between IFR scientists and researchers across the world, and working with international companies to apply IFR science to industry.

### Research opportunity pays dividends for Canadian graduate student

Justin McCarville, a master's degree student in Applied Bioscience at the University Of Ontario Institute Of Technology has recently taken part in a three-month international internship with Professor Claudio Nicoletti, studying the immune response of the cells that line the gastrointestinal tract.

### Refresh

In July IFR hosted a visit by members of the Institute of Animal Reproduction and Food Research of the Polish Academy of Sciences in Olsztyn. The delegation (see picture below) was working on an EU-funded project that is designed to unlock the potential of the Institute, which is located in one of the most underdeveloped parts of Poland. The project, named REFRESH, is providing support to the institute to help it maintain its position as a leading centre in agricultural research. As well as improving the research environment, the project is facilitating a series of visits and exchanges between the Institute and similar organisations throughout Europe.



*Back row L-R, Prof. Tim Brocklehurst, Dr Tomasz Jelinski, Refresh Project WP6 leader, IFR Director Prof. David Boxer, Krzysztof Wilczek Refresh Financial Manager. Front row L-R: Gro Slotsvik, International Manager at IFR and Katarzyna Caplap Refresh Project Manager.*

## Public Engagement

### Canada/United Kingdom Gut and Health Workshop

Early in 2011, IFR took part in the Canada/United Kingdom Gut and Health Workshop. This was organised by the Advanced Foods and Materials Network in Canada and Agriculture and Agri-Food Canada, with funding made available by the British High Commission in Canada. Six IFR scientists joined with colleagues from throughout Canada for workshops based in the University of Guelph and the Food Research and Development Centre of Agriculture and Agri-Food Canada, based in St Hyacinthe. The topic of the workshops was the “Grand Challenge of the interface between bacteria, diet and host in health and wellbeing.” It is envisaged that this first workshop between IFR and Canada will be followed up by exchanges of staff between organisations involved, and a subsequent workshop will be held in the UK in 2012.

### World Food Innovation Network

The world of science is international and the Institute of Food Research has a number of mechanisms by which it maintains a presence on the international stage. These include forming international networks with other knowledge exchange organisations. One such network is the World Food Innovation Network (WoFIN) which has members from Belgium, Canada, Denmark, France, Italy, Spain, Sweden, The Netherlands and the UK. The aim of WoFIN is to access fundamental and applied science throughout the world in order to be able to link to the needs of industry worldwide. The Network became a reality recently with the signature of a Memorandum of Understanding at a meeting of Agrinova/University of Turin, one of our WoFIN partners.

### IFR research featured in 'The Big Picture'

A recent issue of 'Big Picture', the Wellcome Trust's free educational resource for teachers and learners, chose 'what we eat' as its subject. Included in the package was an interview with Richard Faulks who described the research undertaken at IFR to understand the way that food is processed, physically and chemically, in the stomach.



*Richard Faulks in 'The Big Picture'*

### Ask A Food Scientist at LunchBox at the Forum

As part of “Lunchbox,” a festival of street theatre at The Forum in the centre of Norwich, IFR installed some of its scientists to answer any food related questions from the public. Dr Siân Astley and Dave Hart fielded dozens of questions on all aspects of diet, healthy foods, ingredients and safety.



*Ask A Food Scientist at LunchBox at the Forum*

## Schools Regional Champion to inspire the next generation of scientists

Mark Fernandes has been appointed as a Schools Regional Champion for the East of England by the Biotechnology and Biological Sciences Research Council (BBSRC) to help support ongoing efforts to engage and inspire young people in science, maths and technology.

Mark is a mathematical biologist at IFR, and he has been involved in public engagement work with young people for a number of years, working with schools and with other groups such as the Scouts and the general public.

His passion for maths and biology will see him championing the often overlooked role of maths in the biosciences and in the communication, understanding and solving of complex problems.



Mark Fernandes

### About IFR

IFR is a world leader in research into harnessing food for health and preventing food-related diseases. Outputs from IFR research underpin evidence-based advice on healthier ageing, disease prevention strategies, and early detection of risk factors developed for policymakers, the National Health Service and specialist services, industry and the public. It also stimulates innovation in the commercial sector. The Institute is a key fulcrum that links research in the area of food science, diet and health between the major Universities / Institutes and Research Associations in the UK, Europe and worldwide. IFR is making a key contribution to the BBSRC strategic research priorities of Food Security, Bioscience Underpinning Health, and Bioenergy & Industrial Biotechnology. The Institute of Food Research is a company limited by guarantee, and is a registered charity, no. 1058499. Company registration number 03009972

BBSRC is the UK funding agency for research in the life sciences. It provides strategic funding to support research to the following:

- The Babraham Institute
- Institute for Animal Health
- Institute for Biological, Environmental and Rural Studies (Aberystwyth University)
- Institute of Food Research
- John Innes Centre
- The Genome Analysis Centre
- The Roslin Institute (University of Edinburgh)
- Rothamsted Research

### Contact details

Institute of Food Research  
Norwich Research Park  
Colney  
Norwich NR4 7UA  
UK  
Tel. 01603 255000  
E-mail: [ifr.communications@bbsrc.ac.uk](mailto:ifr.communications@bbsrc.ac.uk)



### Data Protection

The mailing list for Science + Innovation (both by post and by e-mail) is private. It is not distributed outwith the BBSRC Institutes on Norwich Research Park.

### This newsletter

Science + Innovation gives a brief introduction to our latest research outcomes and their relevance to our users and stakeholders. For more information, and the full stories, please visit our website at [www.ifr.ac.uk](http://www.ifr.ac.uk), where you can also sign up to receive the newsletter electronically.

ISSN 1746-5869 (print)  
ISSN 1746-5877 (online)

