

# Science+ Innovation

Institute of Food Research

Issue 3:07

## Institute Update

### Future lies in partnership with UEA, confirms BBSRC

At its meeting on 9 October, BBSRC Council decided in principle that research at IFR should be brought more closely alongside that at the University of East Anglia (UEA). This change will enhance the collective impact of research programmes focussed on the delivery of BBSRC's High-Level Research Strategy, 2007-2012.

"I am delighted that our parent research council agrees with our Governing Body that embedding with the University is appropriate" comments IFR Director, Professor David White. "There is common agreement with the University and the John Innes Centre that embedding is the solution of choice for IFR within the Norwich Research Park. This choice is strongly backed by the IFR Executive and staff".

The mission for an enlarged centre of excellence will be to deliver high quality fundamental and strategic research to understand the relationship between food, diet and the optimisation of individual health. The detailed governance arrangements for the new venture are under active discussion but will result in a much greater integration between IFR and UEA. If possible, a decision in principle on the future governance of IFR will be taken at the December 2007 meeting of BBSRC Council. BBSRC has already made clear that its funding commitments to IFR until 2011 are not affected by any proposed change in governance.

We have a draft science vision and strategy for the "new IFR" with appropriate financial commitments from all the key players. Our proposal involves the appointment of up to twelve new Research leaders in the next 3 years and we will achieve greater strength through our scientific alignment with the University, the University Hospital and with scientists at the John Innes Centre, with whom we plan a major new thrust of joint research into natural products.

By end-March 2008, we will have restructured around five strategic programmes – Natural Products, GI Tract, Food Structure in the GI Tract, Food Pathogens & Risk and Behaviour. Our 'Partnerships' will develop, where appropriate increasingly as joint activities with JIC and the University. Exploitation Platforms will continue as an important component of our activity, along with our Knowledge-Transfer platform the Food & Health Network.

### Wibbly wobbly challenge

It is impossible to make a standard strength jelly taller than 10 cm, unless you cheat or use food to stabilise it. BBC TV's national 'Newsround' programme for young people filmed the final of our 'Tallest Jelly' competition, part of this years Bidwells Norwich & Norfolk Food Festival. Turn to the back page to see how local schools used physics, chemistry, engineering and their imaginations to solve our scientific challenge.



### Nathalie Juge joins senior science team

Nathalie Juge has been appointed to lead "Glycobiome and Diet" research. She will be exploiting recent developments in human (meta)genomics to explore the diversity and specificity of enzymes and proteins involved in carbohydrate metabolism in the human gut. Her approaches include functional and comparative genomics, metabolomics and gnotobiotic mouse models to study the molecular events underlying the adaptation of gut bacteria to alterations in nutrient availability. This will be

complemented by detailed molecular enzymology and structural studies of human gut glycoside hydrolases and binding modules involved in hydrolysis of complex polysaccharides and polyphenolic substances. Nathalie was a lecturer in Biochemistry-Molecular Biology at the University of Aix-Marseille III (France) and has 15 years experience in the area of carbohydrate-active enzymes, carbohydrate-binding modules, and protein inhibitors of carbohydrate-active enzymes with application in agriculture, food and nutrition.

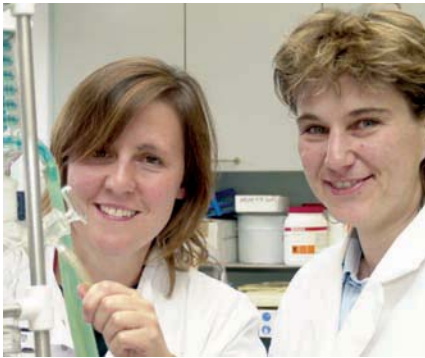


A vital link in the food chain

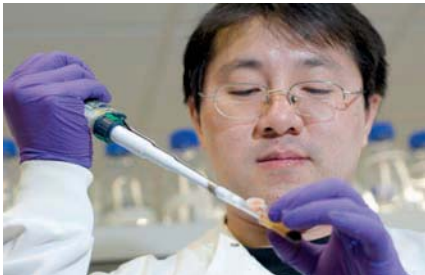
[ifr.ac.uk](http://ifr.ac.uk)

## Potential for engineering anthocyanins

We have made an important advance in understanding the genetic processes that give flowers, leaves and plants their bright colours. Post Doctoral scientists Christine Fuell and Katherine Elliott (IFR) worked with Jie Luo (JIC) to identify enzymes able to beneficially modify anthocyanins - pigments found in plants that give some flowers, leaves and fruits their colours.



Kath Elliott and Christine Fuell



Jie Luo

Plants use colour to attract pollinators and as protection against various environmental stresses. Stabilised anthocyanins could have important uses as natural food colourants. At present, their use is limited because they are degraded, and become discoloured. Stable anthocyanins could replace many of the artificial colours used in a variety of foods, with the added benefit of the health-promoting activities associated with anthocyanins.

There are hundreds of different anthocyanins found in nature, differing from each other by small chemical modifications. The research groups, led by Tony Michael at IFR and Cathie Martin at JIC, looked at acyltransferases, a group of enzymes which transfer acyl groups onto the anthocyanins. Only a few of these enzymes have been characterised, but many more must exist because of the great range of anthocyanins.

The enzymes are very versatile in their substrate specificity, and are thought to be able to evolve rapidly. Very similar enzymes appear to have evolved independently, and are structurally different, but function almost identically. This convergent evolution has hindered conventional approaches to identifying new genes, so a modified strategy was required.

In collaboration with Japanese research groups, they looked at the chemical

structure of the major anthocyanin in *Arabidopsis*, and identified the exact type of acyltransferases needed to make the necessary structural modifications. Acyltransferases are part of a distinct enzyme group, which has 88 members in *Arabidopsis*. Analysing the genetic sequence of these 88 genes found no good candidates for the specific acyltransferases required. Instead, they looked at which of these genes were turned on when the plants were making anthocyanins in response to stress. This identified a smaller number of candidate genes.

Biochemical analysis showed that the candidates could make the necessary modifications to synthesise the major *Arabidopsis* anthocyanin. The enzymes' functions were confirmed when the genes were transferred into tobacco. The acylation of tobacco anthocyanins caused a slight change in the colour of the tobacco flowers. The acylated anthocyanins were also more stable.

**Publication:** Jie Luo *et al.* (2007) Convergent evolution in the BAHF family of acyl transferases: identification and characterization of anthocyanin acyl transferases from *Arabidopsis thaliana*. *The Plant Journal* **50** 678-695

**Funding:** BBSRC AgriFood Committee, BBSRC Core Strategic Grant, Ministry of Education, Japan and Japan Science & Technology Agency CREST

**Collaboration:** RIKEN Plant Sciences Center, Chiba University, Suntory Ltd, Shinshu University, and Ehime Women's College, all in Japan

Contact: **Tony Michael**

## Tony Michael wins Development Fellowship

BBSRC Institute Development Fellowships are designed to enable the Council's senior scientists to spend a period of collaborative work at other research organisations. It's a mechanism for the influx of new ideas in strategically important areas – up to 4 are awarded per annum. Tony will be spending time in the US visiting a number of microbiology laboratories, and will be continuing collaboration with the UT Southwestern Medical School in Dallas initiated by a grant

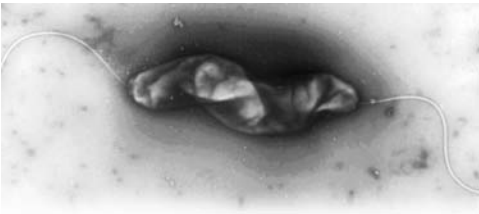
from the UK/US Collaborative Initiative in Bioscience.

This demonstrated that there was greater structural and functional diversity in bacterial polyamine synthesis than previously suspected

Jeongmi Lee *et al.* (2007) Phylogenetic diversity and the structural basis of substrate specificity in the  $\beta/\alpha$ -barrel fold basic amino-acid decarboxylases. *Journal of Biological Chemistry* **282** 27115-27125

## Spotlight on *Campylobacter*

*Campylobacter jejuni* is the leading cause of human enteric disease worldwide and is a major public health and economic burden. Humans are commonly infected by eating undercooked poultry meat, which is contaminated during processing of the chickens. Surprisingly, *Campylobacter* is commonly carried in the gut of birds without causing disease, making it difficult to recognise in flocks.



## Genome sequence of stable *Campylobacter* deciphered

Like many bacteria, *C. jejuni* is able to avoid our body's defences by altering the nature and content of its surface. These alterations are achieved by having regions of the bacterial chromosome that are able to make small random variations, resulting in different surface structures. The levels of genomic variability in *C. jejuni* are much higher than in other enteric pathogens, which has been a problem for researchers since it potentially also causes differences between laboratories and even between experiments.

Strain 81116 is widely used in *Campylobacter* research as it is amenable to genetic alterations, and grows well in

poultry, allowing this important natural reservoir to be studied. The genome sequence reported by IFR and Intervet is 1,628,115 bases in length and notable for having fewer of the variable regions than the previously reported *C. jejuni* genome sequences. The reported sequence will provide useful information for researchers worldwide, and is predicted to be a valuable resource for the research community.

**Publication** : B. M Pearson *et al.* (2007) The complete genome sequence of *Campylobacter jejuni* strain 81116 (NCTC11828). *Journal of Bacteriology* **189** 8402-8403

**Funding**: BBSRC Core Strategic Grant & Industry

**Contact**: [Arnoud van Vliet](#)

## How does *Campylobacter* cope with oxygen?

In a new study funded by the BBSRC, Fran Mulholland and colleagues at IFR, with the University of Sheffield, will investigate the relationship between *C. jejuni* and oxygen using a combination of proteomic, transcriptomic and other biochemical techniques. They will assess how global gene expression changes with oxygen availability in cells grown in continuous chemostat culture at a series of oxygen levels, both below and above the optimum range for growth. This will be complemented by studies of the

response by *Campylobacter* to the imposition of a sudden change to supra-optimal and sub-optimal oxygen levels which happens to the bacteria in nature.

The power of this approach is that the effects of oxygen can be much more precisely defined than in batch culture and we can be more confident that changes in gene expression truly reflect the influence of oxygen.

**Contact**: [Fran Mulholland](#)

## A QUESTION on folic acid fortification

Scientists at IFR have highlighted the possible consequences of fortifying flour with folic acid, as our latest research suggests that folic acid is metabolised in the liver. The liver is an easily saturated system with doses of half the amount being proposed for fortification in the UK, which could lead to significant amounts of unmetabolised folic acid entering the blood stream. This would have the potential to cause a number of health problems, although it could take 20 years for any effects to become apparent.

Fortifying UK flour with folic acid would reduce the incidence of neural tube defects. But it has already been shown that folic acid fortification can provide protection in some people, while causing harm to others. For example, studies have confirmed that unmetabolised folic acid accelerates cognitive decline in the elderly with low vitamin B12 status, while those with normal vitamin B12 status may be protected against cognitive impairment. Most over 65s in the UK have low B12 status. Similarly, dietary folates have a protective effect against cancer, but folic acid supplementation may increase the incidence of bowel cancer. It may also increase the incidence of breast cancer in postmenopausal women.

**Contact**: [Paul Finglas](#)

The *Campylobacter* Group at IFR and their collaborators at the veterinary pharmaceutical company, Intervet, have deciphered and published the complete genome sequence of a strain of *Campylobacter jejuni* 81116 (NCTC11828).

This strain was selected because of its previously reported genomic stability over time.

Above: Transmission Electron Micrograph of *Campylobacter jejuni* (Dr Mary Parker, IFR)

A key distinction in the physiology of *C. jejuni* compared to many other enteric bacteria is that it cannot grow at atmospheric oxygen levels, but does need some oxygen to grow - an interesting paradox; although oxygen sensitive, it nevertheless must be able to survive high environmental oxygen levels, resist the oxidative stresses caused by the immune response to infection, and also adapt to the severe oxygen limitation of the gut in the animal host.

Folic acid is a synthetic form of folate, a B vitamin found in a wide variety of foods including liver and green leafy vegetables. Since the 1980s a consensus has formed that folic acid is metabolised in the small intestine, in a similar way to naturally-occurring folates. This consensus was used to assess the safety of folic acid fortification in the UK.

**Publication**: A. J. A. Wright, J.R. Dainty & P. M. Finglas (2007) Folic acid metabolism in human subjects revisited: potential implications for proposed mandatory folic acid fortification in the UK. *British Journal of Nutrition* **98** 667-675

**Funding**: BBSRC Core Strategic Grant

## Speeding up diagnosis – IFR and UEA provide evidence for the NHS

IFR and UEA have completed an important review of techniques used to diagnose pathogens responsible for bacterial food poisoning. The review was commissioned by the National Institute for Health Research's Health Technology Assessment (NIHR HTA) programme, which produces independent research to give the National Health Service the information it needs to help deliver the best care



Food poisoning is estimated to affect 10 million people in England each year, costing around £250 Million. The majority of cases of food poisoning do not need medical treatment, but for some patients the symptoms may be more severe and even life-threatening. There are a number of different pathogenic bacteria that cause food poisoning, and it is often difficult to tell which one is the culprit based on symptoms alone. Deciding on the appropriate treatment or identifying the source of an outbreak depends on accurate identification of the pathogen involved.

Currently the causes of food poisoning are diagnosed by testing for likely causative bacterial species, which can take up to a week. Modern technology has allowed development of a whole raft of rapid diagnostic techniques, but few are used within the NHS. For the HTA Review, Clare Aldus, Gary Wyatt and Mike Peck reviewed results from evaluations of diagnostic tests for use with food materials that aimed to identify or detect any of the six main causes of bacterial food poisoning. Researchers from UEA performed a similar task, comparing tests for use with clinical samples. They established that in some cases the tests were more accurate than currently used techniques, and could save a substantial amount of time. An economic evaluation, taking into consideration set-up costs and training of staff, was also carried out to determine the financial impacts of introducing new tests. A group of health professionals were asked for their views on the practicalities of implementing new testing strategies, and which tests should be prioritised. The report concluded that the rapid diagnostic tests show good promise for the future, especially those detecting more than one organism at a time, but more work is needed to assess how they should be introduced in practice.

**Link to HTA review:** [www.hta.ac.uk/project/1445.asp](http://www.hta.ac.uk/project/1445.asp)

**Publication:** I Abubakar *et al.* (2007) A systematic review of the clinical, public health and cost-effectiveness of rapid diagnostic tests for the detection and identification of bacterial intestinal pathogens in faeces and food. Health Technology Assessment 11 no 36

Contact: **Mike Peck**

## Low dose of flavonoid in food lowers heart disease risk

There are six classes of flavonoids: flavanols, flavones, isoflavones, flavanones, flavan-3-ols and anthocyanins. The major flavonoid in the diet, quercetin, is mainly found in tea, onions, apples and red wine. The biological activity of flavonoids is highly dependent on their structure, and quercetin metabolites have very different activities from those of the parent compound.

People with high intakes of fruit and vegetables have been found to have a lower risk of cardiovascular disease and it was originally thought this was due to the antioxidant nutrients in plant material. However, research failed to observe beneficial effects in terms of preventing cardiovascular disease (CVD) and recently interest has focused on the protective role that flavonoids (polyphenolic compounds naturally present in fruit and vegetables) may have. Previous IFR research has shown that the flavonoid, quercetin, is metabolised very quickly by the intestine and liver and is not actually found in human blood. In order to assess the contribution of diets rich in fruit and vegetables to protect against CVD, it is crucial that laboratory studies use the relevant compounds and, most importantly, at concentrations achievable through diet. For their study, Paul Kroon and his team analysed the compounds that enter the bloodstream after quercetin is ingested, absorbed and metabolised and used them to treat cells in a simple model of atherosclerosis, as only these compounds will actually have an effect on arterial health.

This is one of very few studies that have used concentrations of quercetin metabolites that are achievable after eating quercetin-rich foods, such as onions. It was the first study to investigate all the major metabolites. It was only possible because the team synthesised the exact compounds found in the blood after eating a quercetin-rich meal.

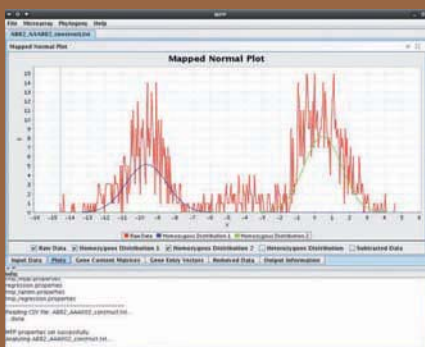
Their research confirmed that eating quercetin-rich foods may help prevent chronic inflammation leading to CVD, because the metabolites still have an effect on the cells lining the blood vessels. The effect is more subtle than laboratory experiments using the parent compound. In the case of one inflammatory process, a lower dose actually had a larger impact and the lower dose was achievable through diet, for example by consuming 100-200g of onions.

**Publication:** Sandra Tribolo *et al.* (2007) Comparative effects of quercetin and its predominant human metabolites on adhesion molecule expression in activated human vascular endothelial cells. *Atherosclerosis In Press*

**Funding:** BBSRC Responsive Mode Grant to IFR

Contact: **David Hughes** and **Paul Kroon**

Genome sequencing projects have now uncovered the DNA blueprints of hundreds of organisms. However, the extraordinary breadth of the tree of life means that when studying a group of closely related organisms, we are only likely to see at most one whose genome has been sequenced. Comparative Genome Hybridisation (CGH) microarray experiments have been developed to partially overcome this problem, assessing the similarities and differences between the gene sets of one sequenced organism and several closely related but unsequenced organisms.



## Estimating the gene contents of closely related organisms

As part of a long-term collaboration between Ian Robert's Group in the National Collection of Yeast Cultures (NCYC) at the Institute of Food Research and Jo Dicks' Group in the Department of Computational and Systems Biology at the John Innes Centre, two PhD students have been developing new computational methods to visualise and analyse the results of CGH microarray experiments. The result of this collaboration is MPP, a new software tool which can read in a series of experimental results, and pass it through an analytical pipeline. The pipeline, a mixture of public and bespoke algorithms, normalises the data, estimates the gene content of each unsequenced organism, calculates a measure of distance between each pair of gene contents and outputs a tree or network structure representing the relationships between them. MPP has been used to analyse a

diverse range of organisms such as yeast, *E. coli* and *Campylobacter jejuni*.

The MPP pipeline has also been adapted to analyse the results of Tagged Microarray Marker (TAM) experiments. TAM microarrays have been used to characterise around 3,000 accessions within the JIC *Pisum* collection for 76 RBIP markers. The resulting MPP analysis has uncovered a fascinating network of relationships between the pea accessions.

**Software:** The MPP software was written in Java and implements the R statistical environment. It is freely available and can be downloaded at <http://cbr.jic.ac.uk/dicks/software/mpp/index.html>

**Publication:** Davey, R., Savva, G., Dicks, J. & Roberts, I.N. (2007) MPP: a microarray-to-phylogeny pipeline for analysis of gene and marker content datasets. *Bioinformatics* **23(8)** 1023-1025

**Funding:** BBSRC PhD studentship for RD, a John Innes Foundation PhD studentship for GS and BBSRC Core Strategic Grant support for JD and INR.

Georgina Pope of the National Collection of Yeast Cultures at IFR, working with IFR colleagues and in collaboration with the Universities of Nottingham and Manchester, has shown that a recently-developed technique called metabolic footprinting can be used to distinguish phenotypes amongst near identical strains of *Saccharomyces cerevisiae*.

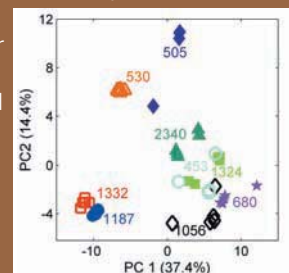
## Footprints distinguish brewing yeasts

Metabolic footprinting uses large-scale mass spectroscopy data to profile the metabolome (the collection of low molecular weight organic and inorganic chemical species present in a cell or biological system). The genetic complexity inherent in the brewing yeast species can result in misclassification and standard genetic methods do not always allow reliable separation of closely related strains. Metabolomic analysis is theoretically expected to have a greater discriminatory power than other methods. This has indeed proved to be the case. Nine different brewing strains have been neatly discriminated and grouped based on their metabolic footprints, including strains which were indistinguishable by standard genetic methods.

The NCYC is also participating in the Sanger Institute's *Saccharomyces* Genome Re-sequencing Project (SGRP). SGRP builds on the original yeast genome project but encompasses a far greater biological diversity, including many strains isolated from "wild" environments as well as those used across the world in a variety of commercial processes. To date, the SGRP, led by Richard Durbin (Sanger Institute) and Ed Louis (University of Nottingham) has produced 1,292 megabases of data. Together they comprise a dataset which can be mined to define limits to functional variation in the most important organism in use in biotechnology today.

**Publication:** Pope *et al.* (2007) Metabolic footprinting as a tool for discriminating between brewing yeasts. *Yeast* **24** 667-679

**Funding:** BBSRC Core Strategic Grant



Metabolic footprinting of brewing yeast strains by GC-TOF-MS, analysed by PCA. NCYC 505 is the type strain of *S. cerevisiae*, NCYC 1187 and NCYC 1332 are ale strains, while all others are lager strains of *S. cerevisiae*, *S. pastorianus* or *S. bayanus*



Having access to quality and accurate compositional data about the food we eat is crucial to regulators, health policy makers, researchers, the food industry and the public. The 2nd International EuroFIR Congress 'Role of food composition data in improving quality, healthiness and safety of European diets', held in Spain, covered how EuroFIR (European Food Information Resource, coordinated by IFR) is contributing to this work. There were over 200 delegates from all over the world, including scientists, members of EFSA (European Food Safety Authority) and industry.



Paul Finglas, Coordinator of EuroFIR presented the poster prize certificate to Maria Graca Dias from the Instituto Nacional de Saude Dr Ricardo Jorge, Portugal, whose poster entitled 'Carotenoids in Portuguese fruits and vegetables' was voted by an expert panel to be the best poster presented by a PhD Student at the Congress

# EuroFIR BASIS

## Bioactive Substances in Food Information Systems

Jenny Plumb from IFR gave a presentation on "EuroFIR BASIS bioactive databank systems" at the EuroFIR Congress. EuroFIR-BASIS is a unique database that collates international research on the composition and beneficial biological effects of plant-based bioactive compounds into a single, comprehensive reference resource. It covers multiple bioactive compound classes and over 300 major European food plants, with data sourced from quality-assessed, peer-reviewed primary publications. The database is internet-deployed to ensure widespread accessibility and outputs are user-defined and easily downloaded. The database is aimed at expert users: scientists, epidemiologists, food



regulatory authorities and food industry professionals, and is a valuable resource for the investigation of food and health relationships. Composition and biological effects data may be used by food regulatory authorities in the

assessment of genetically modified food plants and health claims of plant-based food products and

by the food industry in the development of new products.

**Publication:** EuroFIR-BASIS - a combined composition and biological activity database for bioactive compounds in plant-based foods. J.Gry *et al.* (2007) Trends in Food Science and Technology **18** 434-444.

Work carried out on behalf of the EuroFIR Consortium and funded under the EU FP6 'Food Quality and Safety Programme' (Contract no FP6-513944)

## Securing the skills-base

IFR's 2007/8 PhD student intake includes two Biomedicine graduates from UEA – Karen Prior and Rosy Smith. Karen is this year's NRP student, working on the role of bacterial nitrate metabolism in colonisation of the mammalian gastrointestinal tract.

Lawrence Barrera and Emma Meader are undertaking shared studentships with The Faculty of Health at UEA. Lawrence Barrera is supervised by Nigel Belshaw at IFR and his studentship is jointly held with Yongping Bao (UEA). His project is concerned with how

a combination of selenium and isothiocyanates might reduce oxidative stress and the IFR interest relates to epigenetics events in cancer cell lines.

Emma Meader, with supervisors Dietmar Steverding (UEA) and Mike Gasson, is undertaking a project she proposed herself which relates to the control of *Clostridium difficile*. Emma graduated from The University of Surrey in 2004 with a BSc degree in medical microbiology, and the Queen Mary University of London in 2006 with an MSc in clinical microbiology and is working at the Norfolk and Norwich University Hospital NHS Trust as a clinical microbiologist, balancing a on-going

commitment to this area with her PhD studies.

One of the international starters is Guillaume Meric, with BSc and MSc degrees from the University of Lyon, France who will be investigating the attachment of bacteria to food crops – he is half-funded by Bakkovar, a leading international food manufacturing company specialising in fresh prepared foods and produce.



2007/8 PhD students at IFR

## Knowledge transfer

### Governors – additional support

Professors Barry Hirst and Charles Penn, and Mr David Alderson have joined the Governing Body. Barry Hirst is based at the Institute for Cell and Molecular Biosciences, University of Newcastle. Charles Penn, whose science is concerned with foodborne bacterial pathogens, is from the University of Birmingham. David Alderson has expertise in legal, trust and general commercial management.



New members pictured are (standing, L-R), Prof. Charles Penn; immunologist Prof. Stephan Strobel, Director, Peninsula Postgraduate Health Institute and Professor of Postgraduate Clinical Education; David Gregory, Technical Director, Marks & Spencer plc and (seated, L-R) Prof. Mike Sternberg (who holds the Chair of Structural Bioinformatics at Imperial College, London and is an Adviser to the Science Committee) and Prof. Barry Hirst. Missing: David Alderson

### Science in demand

A paper by Sandra Stringer, June Plowman and Mike Peck on the microbiological quality of hot water washed broccoli florets and cut green beans (*Journal of Applied Microbiology* **102** 41-50) has been identified in 'Microbiologist' magazine as one of the five most downloaded articles published in the *Journal* in 2007. This paper is an output from the EU-funded project OPTIVEG that aimed to improve the quality of minimally heated vegetables, while at the same time ensuring microbiological safety. The paper describes an assessment of the effect of a hot water wash on a number of spoilage and pathogenic microorganisms. The work highlighted the importance of carefully assessing the microbiological safety risk presented by hot wash treatment of vegetables.

**József Baranyi's** work on information systems in food safety management published in 2006 (*J. McMeekin et al. International Journal of Food Microbiology* **112** 181-194) was the most downloaded article from *IJFM* until very recently.

**Julie Houghton** recently visited Japan at the invitation of their Food Safety Commission. She delivered a series of talks on risk communication issues, particularly in the context of the EU-funded SAFE FOODS project. Here she shares a 'top table' at a public meeting with Professor Jun Sekizawa who is Professor, Faculty of Integrated Arts and Sciences, University of Tokushima, and Chairman of the Food Safety Commission's Expert Committee on Risk Communication. Tracey Scarpello Title: Rural Food Experiences



**Tracey Scarpello** has been invited to chair the 'Rural Food work programme at the X11 World Congress of Rural Sociology in July, 2008 in Korea where she will present FSA-funded work on 'Food and the UK Rural Idyll'.

**Pradeep Malakar** recently hosted a 3 month visit by Dr Zengtao Xing from the Shanghai Academy of Agricultural Sciences (SAAS). Zengtao's visit here was primarily to acquaint himself with food safety research in the UK and the possibility of developing collaborative research between IFR and SAAS.

### Significant capital equipment purchases

REI awards have provided a new tranche of equipment purchases, vital for keeping Institutes at the forefront of research.

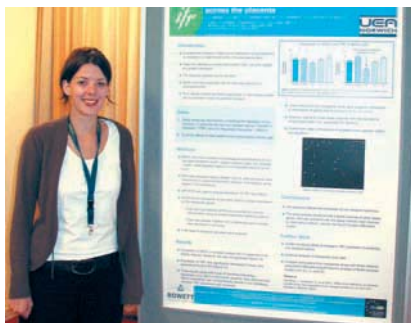
Vic Morris's team have installed a new probe microscope; having pioneered the use of probe microscopy for solving problems in foods, this £150,000 machine (left) provides state-of-the-art facilities for developing force microscopy and providing a routine service for established methods. About £1M has been spent on a BiaCore and Transmission Electron Microscope (to be housed in the new Bioimaging suite at JIC). This and the Orbitrap upgrade to The Sainsbury Laboratory's mass-spectrometer - £171,000 - were combined purchases with JIC and the Sainsbury Lab., aligned to our collective needs and making effective use of combined funding power.

We have installed an 'inFlux' from Cytospeia, more than £150K of High Speed Flow Cytometer - only the third instrument installed in Europe and unique in the U.K. In September we celebrated the installation, holding the 1st Norwich Flow Day with world leading flow cytometry experts on hand including Howard Shapiro, George Janossy and Ger van den Engh.



### Excellence in communications

At NuGOweek 2007 (18th-21st September) in Norway over 120 posters were presented, and reviewed for science communication and scientific content. The winner of the Science Communication prize was **Sarah Heaton** with a joint IFR-UEA presentation on 'BeWo cells as an *in vitro* model for metal transport across the placenta'. Sarah is a BBSRC PhD student funded jointly from IFR (supervisor Dr Ruan Elliott) and the Rowett Research Institute (Professor Harry McArdle), and co-supervised by UEA's Professor Sue Fairweather-Tait and University College London's Prof. Kaila Srari.



**Victoria McCune** (Health Protection Agency, Newcastle) receiving the IFR prize from her supervisor Dr. Andy Sales for her excellent oral presentation on "Development of a multiplexed PCR-microsphere array for rapid detection of pathogens from foods" given at the Society for General Microbiology meeting in Edinburgh in September 2007. The IFR Prize is given to the young scientist who demonstrates the best skills in science communication in the field of food and beverage microbiology at each SGM meeting.



### Proof of Concept funding

The Model Gut Exploitation Platform, led by Martin Wickham has won a £25K grant from the East of England Development Agency's 'Proof of Concept' fund to consider viable routes to market for his innovative model of the human stomach.

### Frolics at the Food Festival

IFR staff find the science of food fascinating and there is no better way to share that fascination with the public than at a festival of food.

During the Opening Weekend of the 2007 Bidwells Norwich and Norfolk Food Festival at the Forum this Autumn, over 600 people explored the difference between taste and flavour by eating a liquorice jelly bean while holding their nose and then letting go.

We had fun with foam on the 'Foam Alone' stand where Festival goers found out about the science behind what makes a good head of beer, how to make the perfect froth for their cappuccino and they were also quizzed about the current trend in food foams. Dave Hart tempted people to try a range of tasty foam creations including chicken and pea, raspberry, tropical fruit or coffee. Only 2% of the foodies had heard of food foams, no-one had made them and only 1% had tried them in a restaurant but 70% thought they would catch on as a healthy alternative to sauces and would try them again.

After struggling to un mould their masterpiece for at least 5 minutes, pupils from Horsford Junior School produced a jelly 23 cm tall, held together with couscous. Outright winners were Diss High School who used noodles and froze their 31 cm creation, but for producing five jellies all over 10 cm which also tasted and looked the best, St Thomas More School, Norwich were the overall champions.

IFR scientists also ran a series of Lunchtime Lectures as part of the Lunch Hour Food Festival. Siân Astley answered the question "What Should I Eat?", Amy Gasper talked about "Food for Health" and our collaboration with the Norfolk & Norwich University Hospital helping us to understand the relationship between diet and health, and for those who are "Struggling with Strawberries, Petrified of Peanuts or Sorry they Ate Shellfish", Claudio Nicoletti explained the cause of food allergies and the research being carried out at IFR to help sufferers in future.



### Total Food 2009 Sustainability of the Agri-Food Chain

Total Food 2009 is the third in a series on biannual international conferences on Norwich Research Park, which focus on the sustainable exploitation of agri-food co-products and related biomass, thereby helping to eliminate waste. The meeting will be run by IFR, under the auspices of the Royal Society of Chemistry Food Chemistry Group. It will comprise plenaries, short talks, poster sessions and focussed workshops and the proceedings will be published. Weblink: [www.ifr.ac.uk/totalfood2009](http://www.ifr.ac.uk/totalfood2009) for further information and details of oral and poster submissions.

#### Our Mission is

- To undertake international quality scientific research relevant to food and human health
- To work in partnership with others to provide underpinning science for consumers, policy makers, the food industry and academia

#### Updating our Contacts

- Please let us know if your address is incorrect, or if you would like to receive Science+Innovation by e-mail in future (contact details right)

#### Data Protection

- Copyright & Data Protection [www.ifr.ac.uk/copyright.html](http://www.ifr.ac.uk/copyright.html)

#### Contact Us

- Communications Team, Norwich BioSciences Institutes Colney, Norwich NR4 7UA  
Tel: +44 (0)1603 255328  
Fax: +44 (0)1603 255168
- Media Enquiries: Zoe Dunford (Media Manager)  
Tel +44 (0) 1603 255111  
Andrew Chapple (Assistant Press Officer)  
Tel +44 (0) 1603 251490
- General Enquiries to the Communications Team  
email [ifr.communications@bbsrc.ac.uk](mailto:ifr.communications@bbsrc.ac.uk)
- E-mail addresses  
[forename.surname@bbsrc.ac.uk](mailto:forename.surname@bbsrc.ac.uk)