

Faculty Research Prizes 2010/11

Examiners and Heads of Department have paid tribute to the outstanding contribution each of the award-winners has made in their chosen field of research....

ARTS FACULTY PRIZE:

“Unearthing Mediaeval Children: An Osteological Analysis of Health, Status and Burial Practice”, by Dr Heidi Dawson of the Faculty of Arts

“Children are one of the forgotten people of the Middle Ages, who rarely appear in history, literature or art; but for archaeologists, they are often some of the most frequent remains found in cemeteries”.

That’s the view of *Bristol Professor Mark Horton*, who has popularised archaeology through his regular television appearances. He was commenting on the award-winning study by Heidi Dawson of one such cemetery excavation at *Taunton* in Somerset, which, he says, has offered new insight into the lives of children of the Middle Ages.

Professor Horton writes “She was able, through the study of more than 400 individuals, to understand the health, demography, and cultural practices of this sample of Somerset’s medieval children. The research was ground-breaking in the manner in which both archaeological and anthropological data was collected and compared to other medieval cemeteries from Gloucester and Canterbury, but also through the use of historical material including portraits and other visual images, to place medieval childhood in its wider social setting. This is an exceptional piece of work - which was approached with systematic rigour and careful analysis.”

ENGINEERING FACULTY PRIZE:

“Modelling and Non-linear Analysis of Aircraft Ground Manoeuvres”, by Dr Etienne Coetzee of the Faculty of Engineering

Etienne Coetzee undertook his PhD in the departments of Engineering Mathematics and Aerospace Engineering whilst an employee of Airbus - completing it within three years .

His research, into the modelling and analysis of aircraft ground manoeuvres, was aimed at classifying the ground dynamics of different-sized aircraft across their entire operational and design envelopes. This dictated the use of highly nonlinear mathematical models. Etienne adopted a *novel approach* to the problem, involving continuation and bifurcation methods, which he showed to be extremely *effective* at a fraction of the cost of the multi-body simulations regularly used in industry.

An essential element in Etienne's work was to show that bifurcation analysis can be implemented directly on industrially validated models. To this end, he developed a unique toolbox that couples the AUTO continuation and bifurcation analysis code to models developed in MATLAB (software commonly used in industry). *This has made bifurcation analysis more accessible to engineers in industry than ever before.*

Using this toolbox, Etienne showed that widely-used geometric methods for the calculation of turn widths are not applicable to large aircraft such as the A380. The identification of a bifurcation in the dynamics of U-turn manoeuvres provided new insights, not easily

attainable from simulations. He established empirical formulae as the basis for runway exit design studies for any aircraft configuration or runway exit, which compared very favourably with more complex kinematic or dynamic model simulations. His continuation studies on aircraft landing gear loads proved that for large aircraft the current regulations for high-speed lateral ground loads are far more stringent than necessary. This is due to nonlinearity in tyre-loadings and aerodynamics, necessitating his nonlinear dynamics approach to the task.

Etienne's PhD research received the highest accolades from the Examiners and from the Graduate Dean, Dr Sally Heslop, who commented how rare it was in mathematical sciences "to engage so deeply with a genuine industrial problem".

They also referred to the "remarkable" computational toolbox developed in the course of the work, and the "timely, significant and major contribution to the interface between nonlinear mathematics and the aviation industry". Etienne's PhD was supported by Airbus.

Dr Mark Lowenberg, co-supervisor.

MEDICAL AND VETERINARY SCIENCE FACULTY PRIZE:

“Haemotropic Mycoplasmas of Mammals”, by Dr Emily Barker

Dr Emily Barker's thesis provides a wealth of cutting-edge information on haemotropic mycoplasmas. These are parasitic bacteria, which cause haemolytic anaemia and reduced productivity in several mammalian species. They are not cultivatable *in vitro* so molecular methods of analysis are crucial to understanding these pathogenic organisms.

Emily has presented the genome sequence of *Mycoplasma haemofelis* strain Langford 1, the first haemoplasma species to be completely sequenced and annotated. The species causes haemolytic anaemia in cats and the genome sequence has provided important insights into the biology of haemoplasmas. Very limited metabolic capabilities appear to be present, which may contribute to the haemoplasmas' current uncultivable status.

Emily also describes the development and application of species-specific canine haemoplasma quantitative polymerase chain reaction (qPCR) assays to evaluate the prevalence of these organisms in different dog populations, and how qPCR can monitor response to antibiotic therapy. Emily's work now enables veterinary surgeons dealing with canine haemoplasma cases to have the tools to diagnose and monitor infection, enabling optimal care to be provided.

Emily also applied a generic haemoplasma qPCR assay to samples collected from a human patient with chronic unresponsive haemolytic anaemia, and confirmed infection with a novel haemoplasma species. A successful response to antibiotic treatment was also monitored by qPCR. This is the first reported case of clinical human haemoplasmosis, and is a particularly important finding indicating that haemoplasmosis, a treatable infection, should be considered as a cause of unexplained haemolysis in humans.

Overall, Emily's PhD has made a huge contribution to haemoplasma research at the molecular level.

Dr Séverine Tasker, supervisor

MEDICINE AND DENTISTRY FACULTY PRIZE:

“Alcohol and Prostate Cancer: Identifying Potentially Modifiable Life-Style Related Causes of Cancer by means of Mendelian Randomisation”, by Dr Luisa Zuccolo

High alcohol intake is increasingly common in Westernised countries, as is prostate cancer, indicating the importance of understanding whether this disease could be prevented by reducing alcohol consumption.

However, investigating the role which alcohol plays in diseases such as prostate cancer is problematic, because alcohol intake is associated with many other social and lifestyle factors which could themselves influence disease risk. Dr Zuccolo used cutting edge epidemiological methods to investigate the causal role that alcohol plays in prostate cancer.

Dr Zuccolo carried-out analyses of the association of common variants in alcohol metabolising genes with alcohol intake amongst men in the ProtecT study (a large population based prostate cancer testing and treatment trial) and amongst women in the Avon Longitudinal Study of Parents and Children (ALSPAC). This analysis suggested that a variant in the alcohol dehydrogenase (ADH1B) gene influences alcohol intake in two European populations and could be used as an instrument to uncover the causal effect on alcohol intake on disease risk.

Dr Zuccolo then used this gene variant, and others found to be associated with alcohol intake, as proxies for alcohol to carry out an unconfounded analysis to determine whether high alcohol intake causes prostate cancer. She found some evidence that heavy alcohol intake may be a risk factor for this disease, but very little evidence for drinking in moderation.

This work has been presented at several meetings and national and international scientific conferences and also published in *Human Molecular Genetics*, a leading genetics journal which has a very high impact in the world of medical research.

*Professor Jenny Donovan, Head of School of Social & Community
Medicine.*

SCIENCE FACULTY RESEARCH PRIZE:

“Galaxies in the Coma Cluster”, by Dr James Price

James' thesis was based on two separate, though related, pieces of work. The first concerned the rare class of compact elliptical galaxies - galaxies of relatively low luminosity, but, more particularly very small size, so that the stars present there are packed unusually close together. James' work was part of the collaboration carrying out the ‘*Hubble Space Telescope Treasury Survey*’ of the Coma Cluster (the nearest very massive cluster of galaxies) which revealed half a dozen of these objects - *doubling the number known*.

He was also able to show that they shared many characteristics with larger galaxies, supporting the theory that compact elliptical galaxies were once much more massive but have been shorn of their outer by gravitational interactions in the cluster environment.

The second part of his work extended the study to encompass 356 bright galaxies in the cluster, using archival spectroscopic data from the Sloan Digital Sky Survey.

He was able to demonstrate a clear dependence of their stellar populations on both the luminosity of the galaxy and its position in the cluster, lower luminosity galaxies and those further from the centre of the cluster containing typically younger stars, and stars with greater abundances of heavier elements (called 'metals' in astrophysics).

This has since been incorporated in further work covering an even wider range of galaxies by Bristol University's collaborators at the University of Durham.

Professor Nick Brook, Head of Physics

SOCIAL SCIENCE AND LAW FACULTY PRIZE:

"Ethical Space and the Experience of Psychosis: A Study of a Dutch Self Help Group", by
Dr Marguerite Marie Peutz

Margreet Peutz's PhD is about the experiences of members of a Dutch self-help group for *psychosis* – a name given to the more severe forms of psychiatric disorders and a term used for a mental state sometimes described as "a loss of contact with reality", during which the sufferer may experience hallucinations or delusions.

As a psychiatrist who later trained as an anthropologist at Cambridge, Marguerite was doubly qualified to study psychotic experience. However, her high academic qualifications might have proved an obstacle to admission to this self-help group. That Marguerite was able to gain an intimate understanding of the activities and concerns of this group of sufferers is testimony to her gifts for honesty and empathy.

The result is a dissertation that gives us a unique understanding of what it is like to live with psychosis and its ever-present threat.

Professor Harriet Bradley, supervisor