

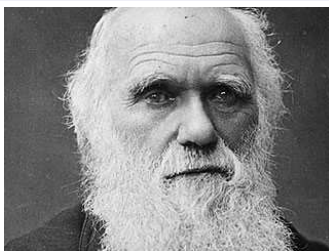
November 2009

In this Issue:

Grant Success for Colorectal Cancer Research	2
Bio.Pics: Life Goes On...	3
Ion Channels: novel therapeutic targets in the treatment of pain	4
Kent Students to work with Turner Contemporary	5
Physics makes an impact	6
Genetic MOT	6
Inaugural Lecture and Astrophysical Forum	7
Kent Schools in Final of Lego League	7
Computer-generated images used to catch criminals	8
Pharmacy student scoops National Essay Award	8
Taking public transport just got easier	9
Distinguished Scientist	9
Fungal Group goes to Europe	10
Seminars in November	11
Grants	12
CAPS	13
Café Scientifique	13



Art of Science
page 3



Charles Darwin at the Gulbenkian—page 9

View from the Dean's Office

Another Hectic academic year has kicked off—so hectic in fact we have not had chance to put together this latest issue until now! Apologies to all you disappointed but avid readers, but I hope we are now back on track with a series of fun-filled issues for 2010. Inside these pages, you'll find reference to some exciting events open to one-and-all—the Annual Wain Lecture (see below), the second Inaugural Lecture (page 7) and a family forensics day (page 8). Please come along and experience 'Sciences@Kent' for yourselves. Also included are articles about how our scientists contribute to disease and pain control and how we interact with regional projects and local industry—a clear demonstration of 'impact'. In the same context, I heard this week that 'BlueJ', an open source system developed @ Kent and Latrobe Universities to help beginner learn to program in Java—attracts over a million downloads each year and is now in use in over 1000 universities worldwide—Impact indeed!

Best wishes
Peter

**Wain Medal Lecture to explore relationship between bacteria and their environment**

Dr Gail Ferguson from the School of Medicine & Dentistry, University of Aberdeen.

The 2009 Wain Medal Lecture at the University will be given by Dr Gail Ferguson from the School of Medicine & Dentistry at the Institute of Medical Sciences, University of Aberdeen.

Entitled 'Stressed Bacteria', Dr Ferguson's lecture will take place at 6pm on Tuesday 10 November in the Brabourne Lecture Theatre, Keynes College, Canterbury campus. It is free and open to all, and will be presented in a way that is accessible to scientists and non-scientists alike.

Dr Ferguson is a leading expert in how bacteria adapt to stress conditions. Her lecture will consider the ways in which bacteria respond to their surroundings, their use in biotechnology and their role in environmental sustainability. It will also explain how knowledge in this area has the potential to significantly enhance healthcare.

Alan Bull, Emeritus Professor of Microbial Technology at the School of Biosciences, said: 'Dr Ferguson is a worthy recipient of this year's Wain Medal. I look forward to what promises to be an illuminating lecture.'

The Wain Medal is awarded annually to a young British scientist who undertakes outstanding research at the interface of chemistry and biology. It is awarded in memory of the late Professor Louis Wain CBE, FRS, Honorary Professor at the University of Kent.

Eurostars Grant Success for Colorectal Cancer Research

Dr. Peter Nicholls of the School of Biosciences is celebrating recent success in securing a 30-month Eurostars Programme grant award for the development of a novel therapy for colorectal cancer. The award, which is in excess of €1.3 million in value, involves a collaboration between four partners – the School of Biosciences, Mologic Ltd. (Sharnbrook, UK), Pepsican Therapeutics BV (Lelystad, The Netherlands) and the UCL (University College London) Cancer Institute. Peter Nicholls, the Project Leader, has had a long working relationship with the Chief Scientific Officer of Mologic – renowned immunologist and Kent Visiting Professor of Immunology, Professor Paul Davis – and is looking forward to spending around half of his time over the coming year as an industry fellow based at Mologic.

As Dr. Nicholls explains: "The Eurostars project aims to develop an improved version of "ADEPT" – "antibody-directed enzyme prodrug therapy" – for the treatment of colon cancer. There remains a huge and growing need for improved treatment of this disease – it causes 16,000 deaths in the UK alone each year, and is the third most common form of cancer diagnosed.

The positive effects of cancer therapies are often limited because the treatment damages normal body cells as well as the ones that make up the tumour; this can result in severe side effects that can reduce quality of life, and even kill the patient. An additional problem is that the tumour cells can eventually develop a resistance to the drug being used, rendering them immune to any further treatment with it. The "ADEPT" approach

is designed to overcome these two problems. In "ADEPT", an antibody that is capable of binding specifically to a molecule found on the surface of colon cancer cells is linked to a protein enzyme called CPG2. CPG2 can chemically convert a harmless molecule known as a "pro-drug" into a powerfully toxic version of the drug, but will only do this to pro-drug molecules that are very close by. In ADEPT, the antibody-CPG2 reagent – also known as the antibody-enzyme construct, or AEC – is injected into the blood stream of a colon cancer patient. The antibody part of the AEC acts as a "guided missile", binding specifically to cancer cells (carrying the CPG2 enzyme with it), but not to normal cells. Once this process is complete, the pro-drug is injected into the patient, and travels all over their body; pro-drug molecules that come close to the AEC reagent will be converted into a powerful toxin by the CPG2 enzyme, and will kill nearby cells. In theory, the AEC will have accumulated in the tumour, so the cells killed are highly likely to be cancer cells, not normal body cells.

Despite the promise of ADEPT, problems were encountered in early trials in patients; firstly it was found that not all of the AEC accumulated in the tumour – some remained in the blood stream, so when pro-drug was injected, it was converted into the toxic form immediately, and caused side effects by killing normal cells distant from the tumour. Secondly, the CPG2 enzyme part of the AEC contains sugars that are added to it by the yeast cell "factories" used to manufacture it; these sugars are detected by cells in the patient's liver, resulting in the AEC being taken up by the liver and destroyed before it has a chance to find the tumour. These are clearly issues that need

to be addressed if this promising therapy is to realise its full potential; the unique combination of technologies and expertise available in my Kent-based laboratory and at Mologic will provide me with an excellent opportunity to address these challenging problems in partnership with industrial scientists of the highest calibre. The project that I will lead has two aims:

(1) To develop and test a novel small molecule known as a "peptide" that will deactivate and aid in the liver clearance of AEC that remains in the blood stream – but have no effect on tumour-bound AEC – thus reducing the side effects of ADEPT;

(2) To develop a version of the AEC that lacks the sugars that result in it being destroyed by the liver before it reaches the tumour.

The information that we gain from the project is highly likely to be of practical use in adapting ADEPT for the treatment of other cancers, and possibly for tackling infectious diseases."

EUREKA's Eurostars Programme is the first European competitive funding and support scheme to be specifically dedicated to small and medium enterprises (SMEs). The aim of the funding is to stimulate the awardees to lead international collaborative research and innovation projects.

A Eurostars project should be market-driven: it must have a maximum duration of three years, and within two years of project completion, the product of the research should be ready for launch onto the market. The exception to this rule applies to biomedical or medical projects like this one, where clinical trials must be started within two years of project completion.



Dr. Peter Nicholls joined the School of Biosciences in 1995. He is an immunologist with over 20 years of expertise in antibody engineering that includes experience in industry (Celltech Therapeutics Ltd) as well as academia. He has had previous direct involvement in projects that resulted in clinical trials for the treatment of cancer, and has been the recipient of project funding from the Leukaemia Research Fund since 1998.

Junior chess club - autumn meetings

The Canterbury Junior Chess club, for 10-16 year olds, will meet on Saturdays from 2-4pm in the Peter Brown Room in Darwin College on the following dates:	3 October	14 November
	17 October	28 November
	31 October	12 December

For further information, contact Dr Owen Lyne 01227 (82)3657, o.d.lyne@kent.ac.uk



Bio.Pics: life goes on... art exhibition shows surprising sources in science research**The Glove Box Room , 8 hour exposure**

This year, the School of Biosciences had Annie Halliday from Whitstable as artist-in-residence. During her time in the School, she captured images of the laboratories and equipment that are quite astounding. Her residency culminated in an exhibition which was extremely successful.

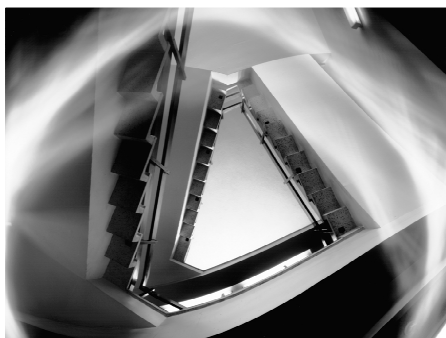
As artist-in-residence, Annie Halliday received an Arts Council grant to explore the potential for making artwork in response to the cutting-edge research projects in the School of Biosciences. She chose two very different approaches

**Nuclear Magnetic Resonance Laboratory, 14 hour exposure**

to capture images: pinhole photography, using the very earliest low-tech camera technique; and composite digital imaging using snapshots from the very latest high-tech digital facilities available in the laboratories, employing fluorescent probes and confocal microscopy (which strangely

enough uses a pinhole to deliver the laser beam scanner!)

Annie said "I have used my early career experience as a biologist, and my current skills as an artist to collaborate with the research teams. The artwork incorporates some of the incredible images from the current projects in the School of

**The stairwell in Biosciences**

Biosciences - projects with outcomes relevant to all our lives."

Annie Halliday's exhibition 'Bio.Pics: life goes on...' celebrated the unsung heroes working at the coal face of biological research. Professors are leading teams of dedicated postgraduate and post-doctoral scientists making important advances in the understanding of life processes. Progress is often made in surprising ways, and with state-of-the-art technology which would have seemed science fiction not so long ago.

Large canvas prints of composite digital

Biosciences Lecture Theatre 1

images shown in the exhibition, reflected these projects, combining micrographs, digital photos, and drawn elements.

The pinhole photographs in the exhibition were taken with cameras made from laboratory water barrels. The interior locations required long exposures (up to 16 hours), so captured time rather than freezing it, giving unique tracings incorporating activity in laboratories,

**Undergraduate Practical Session, Teaching Laboratory, 3 hour exposure**

facilities and other spaces in the department, tracking the movements of scientists and equipment.

Dr. Dan Lloyd, Senior Lecturer in Pharmacology and Programme Director, MSc Science of Communication and Society said "Annie Halliday's collaboration with the School of Biosciences at the University of Kent has mined a rich seam of scientific activities that take place on a day-to-day basis; extended shots of the laboratory environment, images of live cells obtained using state-of-the-art microscopes; tracking the purification of therapeutic proteins; practical training for over 100 undergraduates. With unique and characteristic style, Annie uses her own scientific background to convey scientific discovery and endeavour - this collection of innovative works cleverly brings the scientific process into focus."

About Annie Halliday

Annie Halliday is based in Whitstable, and has exhibited widely in public galleries and museums throughout the UK. She uses experimental photographic ideas to make photograms and direct images, pinhole photographs, and composite digital images. She specialises in sci-art and interdisciplinary projects, photography workshops, educational talks, residencies, commissions.

For more information and more images/higher resolution images please contact Annie Halliday:

phone: 01227 274382

email: mail@anniehalliday.com

web: www.anniehalliday.com

Ion channels: novel therapeutic targets in the treatment of pain

We've all done it. The hot tap is running and we hold out our fingers to test the temperature of the water. Well before the first (perhaps of many) four-letter expletives pass our lips we can feel the pain. Not unbearable at first, but sharp and noticeable and more than enough to make us withdraw our fingers, almost involuntarily, as quickly as we can. How does that work and how does it happen so quickly?

It's all about our nerves. Nerve cells (neurons) use electrical signals to convey information quickly, over long distances, both to and from the brain and within the central nervous system itself. The key players which enable this to occur are membrane spanning proteins called ion channels. The importance of ion channels in underlying neuronal electrical signals, by means of action potentials, was demonstrated originally in the squid giant axon by the UK scientists Alan Hodgkin and Andrew Huxley who won the Nobel Prize in Physiology and Medicine for their work in 1963.

Ion channels are pore-forming proteins that allow the flow of ions across membranes, either plasma membranes or the membranes of intracellular organelles. We have an astonishing number and variety of them: the human genome contains well over two hundred genes that encode for the primary (alpha) subunits of ion channel proteins and the number of different, functioning ion channel proteins is, potentially, an order of magnitude greater than this, because of the formation of heteromeric channel subunit combinations and post translational modifications. The activity of many ion channels, such as most sodium (Na), potassium (K), calcium (Ca) and some chloride (Cl) channels, is gated by voltage but other ion channels, such as certain K and Cl channels, ryanodine receptors and IP₃ receptors, are relatively voltage-insensitive and are gated by second messengers and other intracellular and/or extracellular mediators or ligands. Many ion channels, such as K, Na, and Ca channels, share several structural similarities. These channels are thought to have evolved from a common ancestor and have been classified together as the voltage-gated-like (VGL) ion channel family (see Yu et al, 2005). Other ion channels, however, such as Cl channels, aquaporins and connexins, have

completely different structural properties to the VGL channels, having evolved quite separately.

Gene Family	Proportion of current drugs
Rhodopsin-like GPCRs	26.8 %
Ion channels	13.4 %
Nuclear Receptors	13 %
Penicillin Binding Protein	4.1 %
Myeloperoxidase-like Proteins	3 %

Table 1. The most common gene family targets of current drugs (adapted from Overington et al 2006)

Currently, ion channels, including ligand-gated ion channels, represent the second largest target for existing drugs after G protein-coupled receptors (GPCRs) (Overington et al, 2006, see table 1). Almost all of us will have taken, or will take in the future, drugs that produce their effects through an action on ion channels. These include local anesthetic agents and anti-epileptic drugs, which block Na channels, oral hypoglycaemic agents used in the treatment of type-2 diabetes, which block K channels, and drugs used in the treatment of hypertension, which block Ca channels. Even so, the drug industry has not yet exploited ion channels fully as a drug target and the advent of novel, faster screening techniques for compounds acting on ion channels (Dunlop et al, 2008) suggests that these proteins represent promising targets for the development of additional, novel therapeutic agents in the near future.

For many years now, we have been interested in studying the functional properties and regulation of ion channels. We believe that it is through understanding the underlying physiological properties and roles of these proteins that one may identify appropriate therapeutic targets. We use a variety of state-of-the-art methodologies to study the properties of these proteins, including whole-cell and single-channel patch clamp electrophysiology, molecular biology, such as site-directed mutagenesis, fluorescent imaging of intracellular ions and fluorescently labelled proteins, tissue culture and computer modelling of ion channel structure and functional behaviour. One family of ion channels that my laboratory has studied for a number of years, is the

two-pore domain potassium (K2P) channel family. K2P channels encode background, or leak, K currents which play an important role in the regulation of the resting membrane potential and excitability of many mammalian neurons (see, for example, Mathie and Veale 2007).

We have become particularly interested in the role of ion channels in pain and their identification as potential novel targets in pain treatment. Pain signals are detected by certain nerve cells (primary sensory neurons) which use a variety of ion channel proteins to help transmit this information to the central nervous system. Existing drugs, from non-steroidal anti-inflammatory agents like aspirin, to opioids like morphine, are good, but they often don't alleviate pain completely and, in certain situations, such as neuropathic pain, don't work very well at all. Furthermore, each has the potential for associated problems, particularly if used chronically.



Figure 1. The fruits of Xanthoxylum plants (or toothache trees), often known as Szechuan peppers, have been used for centuries as natural analgesic agents to relieve pain

Recently, an unexpected source has provided evidence that certain K2P channels may have an important role in the transmission of pain signals.

Ion channels: novel therapeutic targets in the treatment of pain...continued from previous page

Xanthoxylum plants, or "toothache trees" (see figure 1), have been used for centuries by various communities as natural analgesics to alleviate acute and chronic pain. Fruits of these plants, sometimes termed Szechuan peppers, have also been used extensively in cooking because of their unique pungent properties, the sensation they produce often described as a tingling or numbing action as oppose to, for example, the burning pain elicited by chilli peppers. It has been suggested that the primary active ingredient from Szechuan peppers (hydroxy-alpha-sanshool) regulates the activity of a subset of pain-signalling, primary sensory neurons by inhibiting certain K2P channels (Bautista et al, 2008). This action on K2P channels is thought to underlie the distinctive numbing effect induced by this natural, widely-used analgesic.

In the last few months we have received support from a number of sources to help us further our research in this area. Dr Xiaoju (Ju) Shi has been awarded a two-year Daphne Jackson fellowship, whilst I have been awarded a four-year Royal Society Industry Fellowship in collaboration with Pfizer. Additionally, we have a BBSRC (Biotechnology and Biological Sciences Research Council) CASE studentship with Pfizer beginning shortly and held a Wellcome Trust Vacation studentship over the summer for one of our continuing undergraduates in Pharmacy, Laura Kardo, to work in this area. Our goal is to understand how these K2P channels

function and how we can regulate this activity with chemicals, perhaps paving the way to the design of more and better drugs. If our instincts are right, we hope that, together with our colleagues at Pfizer, we might begin to discover one or more interesting lead compounds targeting K2P channels that could, one day, prove useful in the treatment of pain. This doesn't, of course, mean we aren't going to continue to burn ourselves occasionally, when running a bath, but if that is our only worry on the pain front, things will have improved considerably.

References

- Bautista et al (2008). Pungent agents from Szechuan peppers excite sensory neurons by inhibiting two-pore potassium channels. *Nat Neurosci* 11: 772-9
- Dunlop et al (2008). High-throughput electrophysiology: an emerging paradigm for ion channel screening and physiology. *Nat Rev Drug Discov* 7: 358-368.
- Mathie and Veale (2007) Therapeutic potential of neuronal two pore domain potassium channel modulators. *Curr Opin Invest Drugs* 8: 555-562.
- Overington et al (2006). How many drug targets are there? *Nat Rev Drug Discov* 5: 993-996.
- Yu et al (2005). Overview of molecular relationships in the voltage-gated ion channel superfamily. *Pharmacol Rev* 57: 387-295.



Alistair Mathie is Professor of Pharmacology at the Medway School of Pharmacy. He established his own laboratory in 1991, first at the Royal Free Hospital School of Medicine then, following merger, at UCL. In 1999, Professor Mathie moved his laboratory to Imperial College London when he took up a position there as Reader in Molecular Neuroscience. In 2007, his laboratory relocated again when he became Professor of Pharmacology, Head of Biological Sciences and Director of Research at the Medway School of Pharmacy, Universities of Kent and Greenwich.

Kent Students to work with Turner Contemporary

Four final-year Multimedia Technology and Design students in the School of Engineering and Digital Arts are to take part in a government-funded project focusing on how different generations reflect on being a teenager. The grant of £28,500 has been awarded by the Department for Business, Innovation and Skills (BIS) to the Turner Contemporary Art Gallery which has designed the project to break down barriers between generations.

The project, called 'Time of Our Lives' will involve the Art Gallery team, the University of Kent and BBC Radio Kent. It will involve research in archives and museums, interviews, gathering and writing stories, organising events, working with artists and people from different generations, all of which will ultimately contribute to a major exhibition exploring the idea of Teenage.

Head of Learning at Turner Contemporary, Karen Eslea said: "I am so delighted to have been awarded this funding. This innovative project will enable us to challenge stereotypes of both older people and teenagers. I hope it will also encourage lots of new people to get involved in the arts, and share their stories, thoughts and memories."

The funding will enable the Kent students to attend recording sessions in Margate, where they will help with the recordings of interviews using the latest digital technologies.

The grant is from the £20 million Transformation Fund, launched by Government to offer funding for two innovative informal adult learning projects in England. This brings to life The Learning Revolution, a White Paper presented to Parliament in March 2009.



David Chipperfield Architects Ltd impression

Building work started on the new gallery in Margate in November 2008 and it will open in 2011. The gallery has been designed by David Chipperfield Architects Ltd, winner of the 2007 RIBA Stirling Prize. Fully accessible, it will feature superb exhibition spaces, education facilities, a cafe and shop and will be one of the largest galleries in the South East. The stunning design celebrates JMW Turner's fascination with light. From the spacious naturally lit galleries to its opaque glass exterior, the building will absorb and reflect light to create a distinctive and inspirational building.

Physics Makes an Impact



Adrian Podoleanu, Professor of Biomedical Optics at the School of Physical Sciences

Pioneering research by Professor Adrian Podoleanu at the School of Physical Sciences, has been cited as an example of how physics can play a vital role in underpinning and improving individual lives and society in general.

Professor Podoleanu's development of a unique non-invasive optical imaging technique that can 'create a powerful diagnostic tool for studying eye disease' has been selected by the Engineering and Physical Sciences Research Council (EPSRC) for its publication *Optics and photonics: Physics enhancing our lives*. The aim of this publication is to highlight and showcase examples of world-leading research in the UK, which has a strong potential for commercial exploitation. It is jointly sponsored by the EPSRC and the Institute of Physics, the professional body and learned society for physics and physicists.

By combining two high-resolution imaging technologies (adaptive optics and optical coherence tomography), Professor Podoleanu has provided doctors with the ability to create 3-D images of the retina, macula and the optic nerve. Such high resolution images can contribute to early diagnosis and treatment of common ocular diseases such as glaucoma, diabetes and age-related macular degeneration. Outside of ophthalmology, Professor Podoleanu's

discovery can be applied to a number of fields, including dentistry, impact crater profilometry and art conservation.

Professor Podoleanu said "This is about an imaging technology whose potential is still not fully exploited and the years to come will see its expansion to fields outside ophthalmology. We are fully engaged in evaluating its value for microscopy where we expect to enhance our abilities in visualising cells, embryos and study materials."

Professor Paul Strange, Head of the School of Physical Sciences, added "This development is an excellent example of physics working for the good of society. I am very pleased that Professor Podoleanu's research has been recognised by the research councils and the Institute of Physics."

Other high-impact research at the School of Physical Sciences includes collaboration between members of the School and UK police forces to improve witness identification methods (*turn to page 8 for full story about Dr Chris Solomon*), and the development of bioactive glass that encourages the re-growth of damaged bones.

Scientists demonstrate success and potential of 'genetic MOT'

In a paper published online by the *Journal of Medical Genetics* (25 October 2009), scientists and fertility experts demonstrate both the success and potential of a test that can screen an embryo for any of the 15000 known genetic diseases pre-existing in the parents. The test, known as karyomapping but dubbed the 'genetic MOT', is the result of a collaboration by teams at the University of Kent, University of Cambridge, University of Leeds, the Genetics and IVF Institute in Fairfax, Virginia (USA), and the London Bridge Fertility, Gynaecology and Genetics Centre.

Darren Griffin, Professor of Genetics at the School of Biosciences, and one of the principal researchers on the test, has described the latest results as being of tremendous importance for IVF couples. 'The test will detect both a single gene disorder and any chromosome imbalance at the same time,' he said. 'It's early days yet but we are hopeful that this test will circumvent some of the current problems surrounding the screening of embryos for chromosome disorders.'



The detection of genetic traits and diseases has a myriad of applications worldwide; its contribution to the health of the general public is considerable and growing. However, one of the drawbacks of current genetic diagnostic tests is that they are tailored to the type of abnormality or trait that they are intended to detect; thus no single universal test has ever existed.

Darren Griffin, Professor of Genetics at the School of Biosciences

Karyomapping circumvents this problem, by making use of innovative technology (a so-called DNA microarray) that picks up tiny variations in the human genome from person to person. In so doing, karyomapping detects the segment of a chromosome that someone has inherited from their parents and grandparents.

Professor Alan Handyside, the principal inventor of karyomapping and Consultant in Pre-implantation Genetics at the Bridge Centre, explained: 'If we have already established which of these grandparental chromosomes carries a mutant gene, we can trace its inheritance through the parents and into the foetus. Thus a single gene disorder like cystic fibrosis and/or a chromosomal disease like Down Syndrome can be detected simultaneously using karyomapping. 'We have also demonstrated that karyomapping is highly sensitive and such a utility is particularly appropriate for diagnosing genetic disease from single cells of IVF embryos.'

Professor Griffin added: 'The collaboration between the University of Kent and the Bridge Centre is opening up a whole range of exciting possibilities for research, treatment and education. I look forward to what the future will bring.'

It is hoped that the test will be approved by the Human Fertilisation and Embryology Authority for introduction to the clinic within six months.

'Karyomapping: a Universal Method for Genome Wide Analysis of Genetic Disease based on Mapping Crossovers between Parental Haplotypes' (Alan H Handyside, Gary L Harton, Brian Mariani, Alan R Thornhill, Nabeel Affara, Marie-Anne Shaw and Darren K Griffin) is published by the *Journal of Medical Genetics* at <http://jmg.bmj.com/cgi/content/abstract/jmg.2009.069971v1> and is a British Medical Journal publication.

Inaugural Lecture and Astrophysical Forum

As part of Kent's celebration of the International Year of Astronomy 2009, Professor Michael Smith, Professor of Astrophysics in the School of Physical Sciences, gives his Inaugural Lecture entitled "The Origin of Stars" on Thursday, 12th November 2009, Grimond Lecture Theatre.



Professor Michael Smith

After the lecture, Professor Peter Jeffries, the Dean of the Faculty of Sciences chairs a topical discussion and debate entitled: "Man on the Moon: Past, Present and Future". Professor Smith will take his seat along with other panellists:



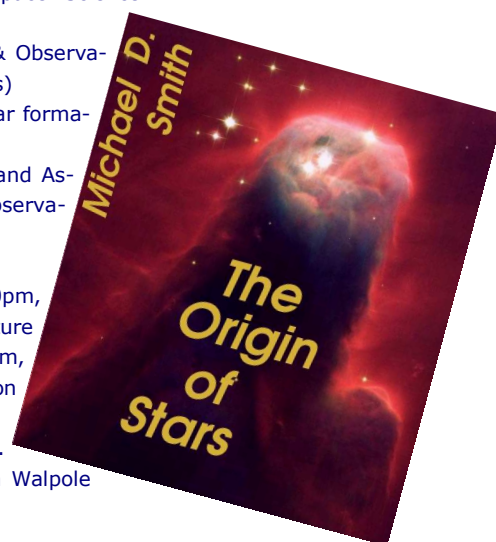
Professor Mark Burchell - Professor of Space Science (Impacts, Planetary Science, Astrobiology)
 Dr Dirk Froebrich - Lecturer in Astronomy & Observatory Manager (Protostars, Interstellar Matters)
 Dr Jingqi Miao - Lecturer in Astrophysics (Star formation, Numerical Astrophysics)
 Dr Stephen Lowry - Lecturer in Astronomy and Astrophysics (Solar System Small Bodies: Observations and Spacecraft Exploration)

Programme:

7pm, Drinks reception in Grimond Foyer
 7.30pm, Professor Michael D Smith's Inaugural Lecture entitled "The Origins of Stars"
 7.45 - 8.30pm, Astrophysical Forum on the subject of "Man on the Moon: Past, Present and Future".

This is a public event and admission is free.

For more information please contact Joanna Walpole 01227 827833.



Kent Schools compete in finals of FIRST LEGO® League

The Kent and Medway regional finals of the FIRST LEGO® League 2009 will take place on Tuesday 24 November in Eliot College Great Hall on the Canterbury Campus.

FIRST LEGO® League is an international programme for school pupils aged nine - 16 years that combines a hands-on, interactive robotics programme with a sports-like atmosphere using LEGO® programmable bricks. Teams consist of seven - 10 players with the focus on team-building, problem-solving, creativity and analytical thinking. As part of the challenge, teams must research, plan, build, programme and test a fully autonomous robot capable of accomplishing that challenge - within eight weeks.

Smart Moves is the title of this year's theme and challenge. The Smart Moves project encourages research into how different kinds of transportation may under perform. Teams should consider what kinds of problems keep people and things from getting where they are going safely or quickly and using the least amount of energy. Over 7,000 teams take part worldwide and the winners of the regional finals will go on to the UK National Finals at Loughborough University on Saturday 23 January 2010.

The event is sponsored by the Kent Branch of the British Computer Society and Medway Education Business Partnership.

The participating finalists are:

Tunbridge Wells Grammar School for Boys,
 Brunswick House Primary School,
 Whitfield and Aspen School,
 SAP Community Team,
 Simon Langton Grammar School for Boys,
 Reigate St Marys School,
 Archers Court Maths and Computing College,
 Byron Primary School,
 King Ethelbert School,
 Kent College,
 Cornwallis Academy,
 Hillview School for Girls,
 Queen Elizabeth's Grammar School,
 St Katherine's C of E Primary School,
 Valley Primary School,
 Kemsing Primary School and The Ellington,
 Sandwich Technology School
 Hereson School.

Computer-Generated Images Used To Catch Criminals

Criminals are facing greater challenges to the concealment of their identity thanks to new software developed at Kent that can help witnesses recreate and recognise suspects.

The software is already being used by approximately 15 police forces throughout UK and in six European countries, including France and Switzerland. In field trials conducted by the Derbyshire police force, it led to twice as many identifications of suspects as traditional methods.

Law enforcement agencies around the world often employ sketch artists, who piece together areas of a face to produce a 'photofit' image which is not always reliably distinct in terms of facial recognition. Key features are described by witnesses - such as hair length, nose size or eye shape - and the artist combines them to create a likeness.

The problem with this approach, said Dr Chris Solomon, Reader in Physics in the School of Physical Sciences, is that it doesn't take into account how the memory actually works. 'There's quite a bit of research in the psychology field suggesting that we're not so good at this, at recalling and describing a face,' he added.

Dr Solomon's software generates its own faces that progressively evolve to match the memories of the witness. The witness starts with a general description such as 'a young white male with dark hair'. Nine different computer-generated faces that roughly fit the description are generated, and the witness identifies the best and worst matches. Dr Solomon said "Over a number of generations, the computer can learn what face you're looking for." The software uses the best fit as a template to automatically generate nine new faces with slightly tweaked features, based on what it learned from the rejected faces.

According to Dr Solomon, one advantage of the technique, is that it can be used on witnesses who can't recall details about a suspect but say that they would remember the face if they saw it again. Traditionally, police sketch artists cannot work with these people. By tapping into recognition instead of recall, the so-called EFIT-V software proved to be quite effective even when witnesses say they can't describe a person. The software has now started to make its way to the USA, where it is being used by researchers in university settings. In the future, Dr Solomon hopes to partner with a suitable US company and market the technology to US police departments.

Family Forensics Day

How good a witness would you make? Do lie detectors really work? These are just a few of the questions which will be answered at a University of Kent Day School on Saturday 14 November.

Titled 'Family Forensics Day - CSI Fact or Fantasy?', the workshop will take place from 10am-3pm on the University's Canterbury campus. The fee is £35 per adult with one child (aged 7+), £15 for every additional child.

Participants will experience a talk using real case law to put forensic science in context, followed by a day of workshop activities using techniques seen on TV. They include finger printing, tool mark impressions, ballistic comparison, crime scene walk through and blood spatter analysis.

The event forms part of the University of Kent's Day Schools programme; other subjects in the series include: Food and Shelter: An Introduction to Low-impact Living; Talking Proper and Talking Funny: An Introduction to English Accents and Dialects; and Identifying Birds in Winter. For more information on the series or to register, please visit the Day Schools website www.kent.ac.uk/dayschools or contact 0800 975 3777.

Erlang project funded by Knowledge Transfer Partnership

The School of Computing and the Unit for Enhancement of Learning and Teaching (UeLT) are collaborating with London-based Erlang Training and Consultancy to develop online e-learning and e-certification packages for the programming language Erlang. The Knowledge Transfer Partnerships (KTP) team within Kent Innovation and Enterprise facilitated £139,000 funding over two years; this is provided by Technology Strategy Board (TSB) and Erlang Training and Consulting Ltd.

The two-year project will enable the academic team, lead by Prof Simon Thompson of the School of Computing and Stephen Ogden of UeLT, to develop new ways of delivering and adapting distance learning methods for computer programmers. As well as supporting the growth of the company it is also expected that their work will inform future Continuous Professional Development and other work-based learning at the University.

Pharmacy Student Samantha Scoops National Essay Award



Medway School of Pharmacy student, Samantha Hayman, 22, from Maidstone, showed she has the 'write stuff' to succeed in her career after winning a prize in a prestigious national essay competition. Winning third prize in the contest, run by the Pharmacy Law and Ethics Association, Samantha proved more than a match for other pharmacy students across the country.

Samantha, is studying for the Master of Pharmacy (MPharm) degree, and aims to work as a hospital pharmacist after she graduates. Her essay tackled the topic of ethics in either providing or withholding medicines for children. She received a cheque for £250 during a recent prizewinners' ceremony held at the Royal Pharmaceutical Society's London headquarters.

Samantha said that she was delighted with her success. "Both the teaching I've received here and the structure of the course has been first-class, and so I feel this recognition is also for the School, and for my tutors." Dr Ruth Rodgers, Senior Lecturer for Medway School of Pharmacy, said that Samantha's achievement was all the more impressive since she entered the competition during her exam revision time earlier this year. "Samantha showed great spirit and initiative in putting her entry forward." To achieve such recognition from the Pharmacy Law and Ethics Association while only in her second year at Medway is a stunning achievement, as Samantha was competing against longer-established schools than ours, and against students with greater experience." Dr Rodgers said.

Medway School of Pharmacy is a unique collaboration between the Universities of Kent and Greenwich and is based at the institutions' shared Chatham Maritime campus.

Taking Public Transport Just got Easier

Dr. Peter Rodgers, Senior Lecturer in the School of Computing has been awarded a Royal Society Industrial Fellowship to work on real-time schematics with Trafficlink and ITIS Holdings. The award provides £117,272 to fund Peter for three years and began on 1 November 2009.

The project involves developing software to produce personal travel maps for public transport journeys, in a schematic style similar to the well-known London Underground map. The traveller will see a clearly laid-out map of the part of the transport network of interest to them. When displayed on internet-enabled mobile phones, these maps would be able to indicate travel information, such as timetables, delays, and also offer alternative routes when trouble is spotted ahead.

The work is in collaboration with ITIS Holdings, the leading provider of real time travel information in the UK.



Dr Peter Rodgers, Senior Lecturer in the School of Computing

Peter said:

"I am very excited about this award, it means I can work with commercial experts to produce schematic maps for phones. The results should help travellers across the UK and encourage people onto public transport."

Computing Professor Becomes 'Distinguished Scientist'



Professor Sally Fincher from the School of Computing

Sally Fincher, Professor of Computing Education in the School of Computing is among the list of only 58 Distinguished Scientists across the world this year, who has been presented with this accolade which is a tribute to her commitment and accomplishments in the field of Computer Science Education.

To be recognised at the level of Distinguished Member Grade by the Association for Computing Machinery (ACM), scientists must have at least 15

years of professional experience and 5 years of continuous Professional Membership with the ACM. For the annual awards, scientists are nominated from all corners of the globe and those who are successful must have demonstrated having achieved a significant accomplishment or having made a significant impact in their field. Sally is recognised as having exhibited eminence by contributing to the field of computer science beyond the norm, including conference presentations or leadership roles within ACM and other organizations. Amongst the selection criteria for which Sally was rewarded, in particular, are significant educational achievements.

The award of Distinguished Scientist demonstrates that Sally has substantial depth and breadth of understanding of the field of computer science, including the creation of new ideas and the synthesis of work by others. It also illustrates her contribution to the advancement of the science of computing, and to building the knowledge base within the field of computer science in addition to having received research awards or grants based on innovative proposals.

Sally said that her award came 'out of the blue', but added that she is delighted for her work to have gained this recognition.

2009 Christmas Lectures

Gulbenkian Theatre

For years 10, 11, 12 and 13 Sponsored by the Institute of Physics

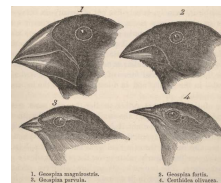
Tuesday 24 November 10.30 am and repeated at 2.30 pm

DARWIN'S BIRDS : HOW EVOLUTION TOOK FLIGHT

Dr Joanne Cooper

Natural History Museum

Darwin's finches and their beaks are famous, but did they really inspire the young Charles Darwin to start thinking about how species change ? From the far-flung discoveries on the Voyage of the Beagle to humble pigeons in Kent, we'll explore how birds helped Darwin to shape his world- changing ideas and find out where he might find evolutionary inspiration today.



Darwin's finches or Galapagos finches. Darwin, 1845. Journal of researches into the natural history and geology of the countries visited during the voyage of H.M.S. Beagle round the world, under the Command of Capt. Fitz Roy, R.N. 2d edition

Wednesday 25 November 10.30 am

FAILURES, DISASTERS AND CATASTROPHES

Steve Walls, University of Kent

Why do some major engineering projects end tragically?

How do we mitigate against such events ?

Wednesday 25 November 2.30 pm

COSMIC ALCHEMY : HOW ARE WE MADE?

Professor Paddy Regan , University of Surrey

How are the elements in our bodies created in the cosmic furnaces of the stars ?

The pseudo-science of alchemy, namely trying to create precious metals from base materials, can now be realized. Using the knowledge of nuclear reactions and astrophysical processes in stars, we can determine how the material from which we are made was created.

Free entry, booking essential
Booking Office 01227 769075

The Kent Fungal Group spreads its filaments to Europe (with a little help from the British Council)

The Kent Fungal Group (KFG) consists of six research groups (with some 25 research staff and students) based in the School of Biosciences that carry out research on various fungal species. The groups share resources (e.g. strain collections), equipment (including state-of-the-art fluorescence microscopes) and expertise. KFG member, Dr Rebecca Hall, spent two months in Paris at the Institut Pasteur from the 11th May to the 5th July.



Bust of Louis Pasteur at the entrance of the Institute

The application process is competitive and provides postdoctoral researchers with the opportunity to write a grant application at an early stage of their career. I would strongly recommend other postdoctoral researchers from the University to apply for funding next year. Please feel free to contact me if you need any advice". Commenting on the Institut Pasteur



Dr Rebecca Hall

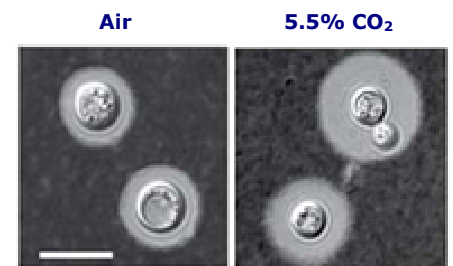
Rebecca works in the lab of Professor Fritz Mühlschlegel on a project funded by the Medical Research Council and her stay at Paris was enabled by the British Council through the Researcher Exchange Program; a program aimed to further promote the UK as an important innovator of science and technology and establish long term research collaborations with other countries.

The Institut Pasteur is internationally leading in the field of infectious diseases with specific focus in the fields of microbiology, virology and immunology. An excellent example of the Institute's contribution to science is the discovery of the HIV virus in 1983, for which they were awarded the 2008 Nobel Prize. In fact, since 1908, eight researchers from the Institut Pasteur have been awarded this prestigious award.

Rebecca joined the *Aspergillus* Unit, which is headed by internationally renowned *Aspergillus* researcher Professor Jean-Paul Latgé in the laboratory of Dr. G. Janbon. The Unit is situated in one of the original buildings built in 1888 and was home to Louis Pasteur during the last seven years of his life (1888-1895). This building houses the memory of Louis Pasteur (south wing) including the funeral chapel where Pasteur is buried and a museum of his scientific career.

The focus of the research was on CO₂-sensing in the opportunistic human fungal pathogen *Cryptococcus neoformans*, a major cause of morbidity in sub-Saharan Africa.

Rebecca said that "this was an amazing opportunity for me. The Researcher Exchange Program is an excellent program.



***C. neoformans* capsule inductin in response to CO₂ (modified from Bahn et al 2005, Curr. Biol. 15, 2013-2020)**

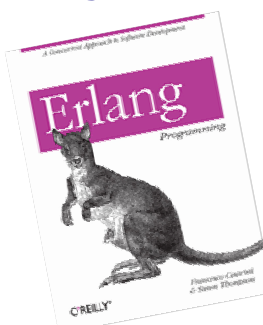
Rebecca said that "working alongside Nobel Prize winners was daunting at first. Despite not speaking a word of French I found the *Aspergillus* Unit warm and friendly and it was great to catch up with former KFG member Dr E. Gewiss-Mogensen who has now been working at the Institut Pasteur for two years".

Currently discussions are in progress with members of the Pasteur as well as other collaborators at Duke University to write a much larger grant between the three parties to further investigate the interesting results generated during Rebecca's stay.



Introduction to Programming

Professor Simon Thompson, Head of the School of Computing, and his co-author Francesco Cesarini of Erlang Training and Consulting, have spent the last year writing their introduction to programming in Erlang, published by O'Reilly Media this summer. Erlang and the OTP (Open Telecom Platform) library and architecture, provide a platform for developing fault-tolerant, soft real-time systems, which can be scaled across distributed systems as well as porting to multi-core architectures with ease. Erlang originated in Ericsson's research labs in the 1980s, and in the 1990s made its way into front-line products such as the AXD301switch which provides British



Telecom's IP (internet provider) backbone in the UK. The last decade has seen Erlang released as open source, and its adoption by enterprises large and small for highly concurrent robust systems. Companies using Erlang include Amazon, Yahoo!, Facebook and T-mobile. This introduction gives a high-level overview of the characteristics and features that have made Erlang successful, providing insight into the context in which the language was designed, and how this influenced its current shape.

The book has received four 5* ratings at amazon[dot]com. Other reviews are available from the Erlang web site [www.erlangprogramming\[dot\]org](http://www.erlangprogramming[dot]org).

November Seminars

Date	Day	Time	Subject	Lecturer and Title	Location
3	Tues	2.30pm	Maths	Mikhail Belolipetsky, Durham. 'Finiteness theorems for arithmetic reflection groups'	Maths LT
5	Thurs	2pm	Statistics	Professor Jennison, Bath. 'Interim monitoring of clinical trials: decision theory, dynamic programming and optimal stopping'	Maths LT
5	Thurs	1pm	FIREbio, Bio-sciences	Careers Session. David Colthurst (Simon Langton Boys School): working in teaching Linda Strand (Pfizer): working as a scientist in industry	Howard Rogers Rm
6	Fri	3pm	Maths	Onno van Gaans, Leiden. 'Periods of nonexpansive maps on finite dimensional normed spaces'	Maths LT
9	Mon	4pm	Biosciences	Professor Steve J. Winder, Dept of Biomedical Science, Sheffield. 'Dystroglycan: a multifunctional adhesion receptor'	Biosciences LT1
10	Tues	7.30pm	Kent Physics Ctr	Dr Zenon Sienkiewicz, Health Protection Agency. 'Mobile Phones: Their Effect on Health'	Eliot Lecture Theatre 2
10	Tues	2.30pm	Maths	Jon Selig, London South Bank University. 'Lie Groups and Lie Algebras in Robotics'	Maths LT
11	Wed	2pm	SPS	C.D.Murray- Queen Mary, University of London. 'The Dynamics of Saturn's F ring'	SPS RM110
11	Wed	4pm	EDA Research	Marjory Abreu. 'Some Approaches to Developing Optimised Classifier Structures for Biometric Processing'	ElecSem2
11	Wed	1pm	CBMI	Radu Zabet, School of Computing. 'Computational limits to binary genes'	Marlowe LT2
12	Thurs	2pm	Statistics	Professor Dankmar Böhning, Reading. 'Capture-recapture estimation of population size by means of empirical Bayesian smoothing'	Maths LT
12	Thurs	1pm	FIREbio, Bio-sciences		Martin Warren Lab
13	Fri	3pm	Maths	Steffen Krusch, Kent. 'Hyperbolic Vortices'	Maths LT
16	Mon	4pm	Biosciences	Dr. Alex Bateman, Wellcome Trust Sanger Institute, Wellcome Trust Genome Campus, Cambridge. 'Evolution of protein domain families'	Biosciences LT1
17	Tues	7.30pm	Kent Physics Ctr	Mr Stuart Field, Consultant Radiologist - Retired, Medical Physics Department, Kent and Canterbury Hospital. 'Electricity and X-rays in Medical Studies'	Eliot Lecture Theatre 2
17	Tues	2pm	SPS	Matt Jarvis - Centre for Astrophysics, University of Hertfordshire. 'The evolution of Active Galactic Nuclei over cosmic time: Current status and future prospects'	SPS RM110
17	Tues	2.30pm	Maths	Julius Ross, Cambridge. 'Scalar Curvature and Algebraic Geometry'	Maths LT
18	Wed	4.15pm	CNCS	Srivas Chennu, Kent. 'All-or-none conscious perception and the Attentional Blink'	Computing S110B
18	Wed	2pm	SPS	Tomaso Aste, SPS, Kent. 'Insights into Jamming of Discrete Matter'	SPS RM110
18	Wed	4pm	EDA Research	Bogdan Gherman. 'Data Complexity Driven Task Decomposition in Modular Neural Networks'	ElecSem2
19	Thurs	1pm	FIREbio, Bio-sciences	Cairn Research, Emerging Technologies Session, 'Novel microscopy tools'	Howard Rogers Rm
20	Fri	3pm	Maths	Gavin Brown, Kent. 'Potential density for Fano varieties'	Maths LT
23	Mon	4pm	Biosciences	Professor Anne Willis, Centre for Biomolecular Sciences, Nottingham. 'Regulation of translation during cell stress'	Biosciences LT1
24	Tues	2.30pm	Maths	Gerard Watts, King's College, London.	Maths LT
24	Tues	4pm	Computing	Lachlan M. MacKinnon, University of Abertay Dundee. 'Learning is an individual, personal and social experience - developing an academic pedagogy'	Brian Spratt Room
25	Wed	4pm	EDA Research	Dr Anne Canuto. 'Designing Diverse and Accurate Committees of Classifiers'	ElecSem2
26	Thurs	2pm	Statistics	Dr Mounia Hocine, Open University. 'The case series method: models and applications'	Maths LT
26	Thurs	1pm	FIREbio, Bio-sciences	Biotechnology and Public Affairs week: Dr. Mark Carver. 'The cost of Biologics, the public impact of this and how it can be addressed (and of course why good science is needed to deliver public benefit)'	Howard Rogers Rm
27	Fri	3pm	Maths	Paulo Eduardo Goncalves de Assis, City and Kent. 'Non-Hermitian Hamiltonians in field theory'	Maths LT
30	Mon	4pm	Biosciences	Dr. Christian Damblon, Chimie Biologique Structurale, Institut de Chimie, Université de Liège, Belgium. 'Fighting antibiotics resistance: NMR structural studies of metallo-beta-lactamases'	Biosciences LT1

Recent Grants Awarded

School of Engineering and Digital Arts

Dr Konstantinos Sirlantzis, Dr Gareth Howells, Dr Sanaul Hoque and Dr Farzin Deravi have been awarded €244,076 for research entitled 'Nomad Biometric Authentication (NOBA)' by the Managing Authority Interreg 4A.

Dr Matthew Pepper, Professor Sarah Spurgeon, Professor Yong Yan have been awarded £45,000 for research entitled 'A multi-parameter assessment of upper limb movement throughout rehabilitation (studentship for Lu Bai)' by East Kent Hospitals University NHS Foundation Trust.

Professor Michael Fairhurst and Dr Richard Guest have been awarded £42,000 for research entitled 'Age related effect in biometric systems delivery' by the Identity and Passport Service.

Professor Sarah Spurgeon has been awarded £4,967 for a Distinguished Visiting Fellowship for Professor Bijnan Bandyopadhyay, IIT Bombay, India by the Royal Academy of Engineering.

Winston Waller has been awarded £650 for CANbus Training from ITW Switches.

Catherine Butler has been awarded £537.78 for Flash Training from Canterbury City Council.

Nigel Simpson has been awarded £450 for EMC Testing Facility by Saturn Solutions Ltd.

School of Biosciences

Professor Mark Smales has been awarded £312,456 for research entitled 'Investigation of improved protein synthesis/mRNA translation and growth characteristics in CHO cells for enhanced mAb production' by Lonza Biologics plc.

Professor Mark Smales has been awarded £72,000 for research entitled 'Manipulation of signal peptide sequences for enhanced synthesis and secretion of biotherapeutic monoclonal antibodies' by Medimmune Ltd.

Dr Peter Klappa has been awarded £48,000 for research entitled 'Improving refolding of recombinant proteins expressed in inclusion bodies' by Arecor Ltd.

Professor Mark Smales has been awarded £31,020 for research entitled 'Engineering antidocoy formats for enhanced stability and reduced aggregation' by UCB Celltech.

Professor Mark Smales has been awarded £10,000 for research entitled 'Profiling the CHO host cell proteome and development of alternative downstream processing of recombinant proteins' by Pall Europe Ltd.

School of Mathematics, Statistics and Actuarial Science

Professor Phil Brown and Dr Alexa Laurence have been awarded £42,971 for a project entitled 'South East Research Design Service (RDS)' by the Department of Health.

Dr Ian Wood has been awarded £6,000 for research entitled 'New Trends in Spectral Theory and Applications' by the London Mathematical Society.

Dr Ian Wood has been awarded £1,200 for a Visiting Fellowship for Professor S Naboko by the London Mathematical Society.

School of Computing

Professor Simon Thompson has been awarded £93,436 for a Knowledge Transfer Partnership—E Learning Project by the AEA Group.

Professor Simon Thompson has been awarded £46,021 for a Knowledge Transfer Partnership—E Learning Project by Erlang Training and Consulting Ltd.

Dr Dominique Chu has been awarded Kr200,000 for research entitled 'Reflexive Systems Biology: Towards a appreciation of biological, scientific and ethical complexity' by the Research Council of Norway via University of Bergen.

Richard Jones has been awarded £3,171 for a Distinguished Visiting Fellowship for Professor J Eliot B Moss by the Royal Academy of Engineering.



Moon Exploration from the Ingram Building



by tidal stresses from the earth, and some were caused by meteorite impacts.

The moon, lacking an atmosphere, also lacks most of the erosive processes present on the earth, retaining only impacts as a potential vector for erosion. As a consequence, the surface rock is extremely old, some dating to a period only shortly after the formation of the moon, ~4.5 billion years ago. Over this period, the moon has been bombarded by a considerable amount of material. By examining the moon through a telescope, many craters are visible as shown in the image taken by Georgios Ioannidis of the Centre for Astrophysics and Planetary Science within SPS.

Much research takes place in SPS to identify and characterise lunar craters as well as to analyse their properties. Stuart Standen has been diagnosing craters for his Masters while the Applied Optics Group has developed methods for analysing lunar surface images. An exciting development in Mark Burchell's Impact Laboratory is a collaboration with NASA to improve impact sensor technology.

Micrometeoroids regularly impact artificial objects in space. Most of these are unnoticeable due to their size, but occasionally, larger impacts occur which can seriously damage satellites and manned space vehicles. With the beginning of the new NASA Constellation Program and Chinese interest in manned flights to the Moon, there is a growing need to investigate impacts and their hazards.

The Moon is, in comparison to the Earth, nearly dead tectonically. Over a period of eight years of operation, the seismographs recorded approximately 3600 events. Some of these were moonquakes from deep in the lunar mantle, caused

This superb astronomical image was captured by, Georgios Ionnidis, who is one of the new PhD students to join CAPS.

For more information about CAPS, please contact: Professor Michael Smith, Professor of Astronomy, School of Physical Sciences

Professor Michael Smith will be giving his Inaugural Lecture on Thursday, 12 November 2009 in the Grimond Lecture Theatre. See page 7 for details



**Café Scientifique
Ye Olde Beverlie,
St Stephen's Green,
Canterbury**

Tuesday 10 November 2009

Dr. Charlotte Sleight, School of History, University of Kent: Patrons of science: then and now

Science has always been an expensive business, and scientists have long relied on patrons to fund their research and to bring it kudos. Historians of science have discovered some entertaining and unexpected things about these relationships; on the basis of their findings we can also ask what form the patronage of science takes in the present, and whether it works for good or ill ...?

**University of
Kent**

www.kent.ac.uk

Editor— Joanna Walpole
University of Kent
Marlowe Building
Canterbury
Kent
CT2 7NR

For further information contact:
J.L.Walpole@kent.ac.uk
01227 82 7833
For back issues follow the link:-