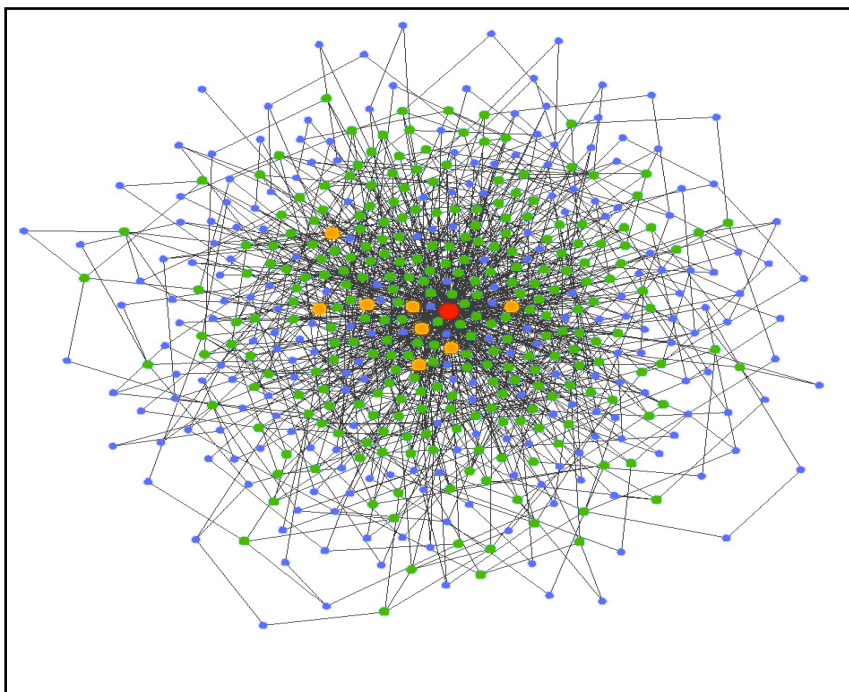


# Advanced Studies Centre

## News from Trinity term



### Networks cluster

How may we better understand complex systems and the underlying network-like patterns that exist within them? Physicists, computer scientists, statisticians, biologists and economists within the Networks cluster are exploring these important questions using sophisticated statistical analyses and simulation methods, originally developed to understand quantum physics. These techniques can be applied to unravel the structure of communities, the intricate behaviour of complex networks, their resilience or robustness, and how they evolved to be optimized for specific tasks.

The cluster offers exciting possibilities in understanding complex real-world problems and their underlying patterns in fields as diverse as finance, biology, engineering, ecology, social science or mathematics. Recent work based on studies of the dynamics of ecological food webs, within which infectious diseases can spread, has drawn important lessons for the ways in which financial networks of banks operate and sometimes fail, as in the recent global financial crisis. There are significant potential applications in many areas where understanding and predicting the behaviour of systems is important.

## Networks cluster workshop

The Keble Networks cluster ran a very successful workshop this term, involving participants from Keble, the wider UK and overseas. The cluster has recently requested funding which will address a clear research community need identified through their collaborations so far – to establish a database based on worldwide research to form a “common language” for assessing networks: biological, physical or social. This will be of enormous benefit in seeing similarities and

how concepts in one network can be applied in another. The funding of this, and an associated website, will help to establish the ASC and Keble as an international virtual hub of research in this area. It also builds partly on collaboration with a visitor to Keble from the Harvard Medical School, Dr Onnela, who discussed his work on the similarities between political and economic networks and the growth of fungus.

### NEW CLUSTER MEETING : PARTIAL DIFFERENTIAL EQUATIONS

A new research cluster, built around the important field of Partial Differential Equations (PDEs) is emerging in college, led by mathematicians Prof. Gui-Qiang Chen and Dr Apala Majumdar. PDEs are key equations for anyone who wants to use maths to solve real life problems. Mathematical descriptions of physical systems are typically phrased in terms of rates of change, or derivatives. A differential



equation is an equation involving the derivatives of a function, and solving it amounts to finding the function itself. What is exciting about PDEs is their universal applicability and their flexibility in allowing us to try and model and understand changes in different systems. Modelling the behaviours of waves is a good example.

Cluster members held their first meeting in 8th week.

# Creativity cluster lecture series

KEBLE COLLEGE  
ADVANCED STUDIES CENTRE



## Creativity Lecture Series 2011 "THE PROCESS OF CREATIVITY"

*Friday 29 April*

Prof. Nicholas Humphrey (LSE)

"Soul Dust: the Science and Art of Consciousness"

*Friday 6 May*

Prof. Richard Harper (Microsoft Research., Cambridge)

"Creative Selves, Creative Expression"

*Friday 3 June*

Prof. Tim Ingold (University of Aberdeen)

"Creativity: Abduction or Improvisation?"

*Friday 24 June*

Prof. Steve Rayner (University of Oxford)

"Two Sides of the Creativity Coin: Innovation and Lock-in"

Lectures will commence at 5.00 pm,  
in the Keble College O'Reilly Lecture Theatre  
followed by a wine reception  
in the Newman Quad

Convenor of the series:  
*Dr Lambros Malafouris*

A fascinating series of lectures on the processes of Creativity ended last week with Prof. Steve Rayner's talk on 'innovation and lock-in', drawing on his experiences of the science of climate change. Other speakers included Prof. Richard Harper of Microsoft Research and Prof. Tim Ingold, of the University of Aberdeen. The series, organised by Career Development Fellow (CDF) Dr Lambros Malafouris, has ranged widely across aspects of the creative process. The Creativity Cluster consists of researchers from archaeology, neuroscience, anthropology and geography, as well as writers, their common interest is in examining how humans create and how the creative process developed during the evolution of humans. Talks from the Creativity meetings have been recorded, and will be made available on the internet for viewing again. Further seminars are planned for next year. Meanwhile Dr Malafouris has been successful in the latest round of the Keble ASC Small Research Grants and will undertake research into the creative aspects of pottery makers in ceramic workshops in western Greece.



Dr Lambros Malafouris  
CDF in Creativity at Keble College

**Keble**  
College

### NEW CDF APPOINTMENT IN RENAISSANCE STUDIES

We have appointed our new Career Development Fellow in Renaissance Studies. She is Dr Tracey Sowerby, whose work on early modern diplomacy links history, anthropology, literary studies and art history. The CDF will form the cornerstone will form the cornerstone of interdisciplinary work in our Medieval and Renaissance Studies Cluster.





## LONDON LECTURE III

**Radiocarbon and Neanderthals**

The 3rd London Lecture for Keble Old Members was given at the Royal Society by Dr Tom Higham, Interim Director of the ASC, in May. It was called “*Dating the Past: from Neanderthals, to ancient Egypt, to forensic science*”, and outlined the crucial nature of how radiocarbon dating underpins a proper understanding of the prehistoric past, as well as in dating very recent events, such as forensic and murder cases too. The next London Lecture will be held on Thursday 17 November at 18:00 at HoganLovells in London. Old Member Andy Street (1982), MD of John Lewis, will talk about building a brand.

## SMALL GRANTS AWARDED

A new series of applications to the **Keble Small Research Grants** scheme have been reviewed recently in College. The scheme is designed to enable Fellows to apply for small grants to develop areas of new research, build new collaborations and complete research projects. This round, 10 applications were funded, ranging from the analysis of soil microbes, to the repair of cell DNA, and from the poetry of Geoffrey Hill to the study of partial differential equations. The first round of Keble/ASC small grants last year led to a laboratory breakthrough for which a formal invention record has been lodged, the first step to a patent application. Further ASC Newsletters will report on the research outcomes of previous grants awarded to some of our Fellows.

# Imaging cluster workshop



**Keble**  
College



The Imaging Research Cluster is proud to announce its Domus Workshop this term

Thursday June 9th (week 6)

5.30 p.m. Roy Griffiths Room, Keble

All interested members of the College and the University are welcome

## Dr Simon Butt

Our Fellow in Neuroscience

### *“Finding the (fluorescent) needle in the growing haystack”*

*We’re developing strategies to identify discrete populations of nerve cells within the vast complexity of the mammalian brain. We rely on powerful developmental genetics to probe and dissect fluorescently-tagged cells in brains in the making. Our ultimate goal is a very modest one: to know the identity and putative functions of specific cell types in every nook and cranny of the living intact brain.*

## Dr Brid Cronin

Our Research Fellow and Tutor in Chemistry

### *“Droplet Interface Bilayers and Single Molecule Fluorescence”*

*The biophysics of membranes is our playing field: lipids, embedded proteins and toxins are the players. We brew artificial cell membranes as droplets with interface bilayers so as to measure the fluorescence of just one single molecule and the conductance of just one single channel – both at the same time! It’s a smart trick that allows us to become voyeurs of individual molecules as they party together.*

Image: Pyramidal neurons Credit Prof. M. Hausser/UCL, © Wellcome Images B0007842

Members of the Imaging Cluster recently enjoyed two fascinating lectures of aspects of cellular and molecular fluorescence in the brain, and in single molecules respectively. Dr Simon Butt, our Neuroscience fellow, began with an engaging look at interneurons in the brain, and described his work in the emerging field of developmental genetics. He examined how scientists are examining the development of juvenile brains using DNA, and what happens to the architecture of the brain if different genes are switched off. He talked about the structure of the brain and future work in deciphering what parts of the brain are responsible for different parts of our behaviour. Dr Brid Cronin, Research Fellow and Tutor in Chemistry, then presented her work on creating artificial molecules. She makes artificial cell membranes and studies their behaviour using fluorescence, generated by conductance. This enables her to observe the behaviour of molecules and study their interaction with each other. Further exciting workshops and lectures are currently being planned by the cluster for next term and the following year.