Graduate Research Symposium 2013

Peterhouse MCR
9 November

Welcome

Every year the Graduate Society of Peterhouse hosts this symposium to present the research conducted by its graduate members to the rest of the college. The symposium seeks to utilise the advantage of the Oxbridge collegiate system by providing a platform for all members of Peterhouse to discuss the broad range of research that takes place in our community.

In the spirit of interdisciplinary discussion, this year's symposium is structured to alternate between science and arts presentations. This year we are particularly proud to have twenty presenters from a diverse array of research fields and at various stages of their research. Following the success of last year's symposium two speakers were invited to present their talks to the Peterhouse Annual Gathering, thereby providing some highlights of the fascinating and varied research conducted within the MCR to yet more Petreans.

The symposium has always been well supported by the college, foremost of which has been the Master. This year we are delighted to additionally have the support of our newly appointed Graduate Tutors. In particular Prof. Connor's enthusiasm and support for the symposium has been a great asset in the organising of this year's event.

On a final note, in addition to the wide array of topics on display today, many of the presenters are bravely displaying an equally wide array of 9-day-old moustaches in support of the Peterhouse MCR & JCR Movember Charity Campaign. Movember is a charity drive that seeks to highlight and fund research into men's health challenges through the use of freshly grown moustaches as conversational focal pieces. I'd like to personally encourage you to read more on the topic and consider donating a few pounds to the charity on behalf of your favourite presenter and/or moustache by following the links on the back of this booklet.

My thanks on behalf of the MCR committee,

Erik Pickering
MCR Secretary

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Schedule

Breakfast Platter – Lubbock Room
9h30-10h00
Bacon rolls, Danish pastries and fruit platters together with tea, coffee & juice

Welcoming Address – Peterhouse Theatre
10h00-10h15

Panel I – Peterhouse Theatre
10h15-11h30

Tea Break – Lubbock Room
11h30-12h00
Tea, coffee, juice & nibbles

Panel II – Peterhouse Theatre
12h00-13h15

Lunch Break – Lubbock Room
13h15-14h00
Sandwiches, chocolate éclairs & fruit platters

Panel III – Peterhouse Theatre
14h00-15h15

Tea Break – Lubbock Room
15h15-15h45
Tea, coffee, juice & nibbles

Panel IV – Peterhouse Theatre
15h45-17h00

Closing Address – Peterhouse Theatre
17h00-17h15
followed by an informal trip to the pub

Panel Composition

Panel I

Jack Clearman	***Relationships between working memory, mathematics, and dyscalculia***
Seb Falk	***King Arthur's Table: Learning From a Replica Scientific Instrument***
Sabine Arndt	***Determination of the endogenous H2S concentration in cells using the mitochondria-targeted MitoAzidoarene***
Emma Greensmith	***Odysseus' Inner Suitors: The Deconstruction of Epic Antagonism in Homer's Odyssey***
Paul Beecher	***Enabling Novel Conformal Devices Through Nanotechnology***

Panel II

Philipp-Maximilian Jacob	***Network of Organic Chemistry to biorefining***
Daisy Dixon	***Kripke on Empty Terms***
Dr. Nyarie Sithole	***New Therapeutic Targets to inhibit HIV-1 replication: The Role/s of DDX5 and DDX17 in HIV-1 Replication***
Jonas Baier	***A comparative perspective on accession, composition and production in England and Germany***
Chris Warwick	***Organic Electronics: how does it work?***

Panel III

Michael Burke	***Pantomimic gesture recognition for human robot interaction***
Daniel Robinson	***Colonial British American Attitudes Towards International Relations, c. 1727 - 1763***
Josephine Hellberg	***Man is but a Worm: Using the nematode worm C. elegans to test the predictions of a new theory of why ageing happens***
Steven McGregor	***The Egyptian Army in Mexico, 1863-1867***
Emanuel Malek	***String theory, M-theory and Double Field Theory; Why small and big circles are the same***

Panel IV

Joe Hanly	***Why do animals look the way they do? Using Butterflies to investigate within-species and between-species variation***
Christina Tsanaki	***Ovid in Exile***
Jamie Blaza	***Using complex III haems to define the nature of the quinone pool and understand complex I quinone kinetics in mitochondria***
Jan-Jonathan Bock	***Social Life in the Aftermath of the L'Aquila Earthquake***
Britta Kuempers	***The leaf developmental gradient in plant species with C3 and C4 photosynthesis***

Professor Steven Connor

Chair

The MCR is delighted to introduce the chair for the Peterhouse Graduate Research Symposium, Professor Steven Connor. Steven Connor is Grace 2 Professor of English at the University of Cambridge and Fellow of Peterhouse, Cambridge. As of 2013 Prof Connor has been appointed as the Graduate Tutor (Arts) and the Graduate Affairs Tutor for the Peterhouse Graduate Society (MCR).

Prior to joining Peterhouse, Prof Connor was the Academic Director of the London Consortium Programme in Humanities and Cultural Studies from 2003 to 2012 whilst maintaining his long tenure at Birkbeck University of London. Whilst at Birkbeck, Prof Connor served in a variety of capacities ranging from lecturer, to ultimately College Orator and Pro-Vice-Master for International and Research Students. Outside of his many publications on a host of topics, Prof Connor is well known for his radio work primarily with the BBC through which he has extended the reach of English studies and cultural history.

Relationships between working memory, mathematics, and dyscalculia

Jack Clearman
PhD Psychology (1st Year)

Dyscalculia has been addressed as a mathematical learning disorder that affects roughly 6-9% of student populations. Its prevalence is equal to dyslexia and similarly debilitating. Symptoms may include difficulty with math concepts, spatial difficulties (directions, awareness), face blindness (not matching a name to a face), and comorbidity with other learning disorders (dyslexia, dysgraphia). Despite this, there is little work done on dyscalculia. Furthermore, the current literature primarily focuses on numerical representation in a single neural region, ignoring the complexity of the dysfunction. My work aims to compartmentalize a newly suggested aspect of dyscalculia: working memory and its subsidiaries, specifically visual/spatial working memory (VWM). To do so I will implement tasks such interference suppression, visual tracking, and memory maintenance in adults. This foundational work will provide a base data set on VWM for further work with children, and finally dyscalculiacs. To bolster my behavioral data I will be implementing eye tracking and electrophysiology (EEG) hardware to better understand relationships between eye movements (saccade, fixation, antisaccade), neural activity, and visual working memory. Together, the fields of psychology, neuroscience, cognition, and education will be addressed.

King Arthur's Table: Learning from a Replica Scientific Instrument

Seb Falk
PhD History of Science (2nd Year)

"King Arthur's Table" is not a table, nor has it anything to do with King Arthur. It is a twentieth-century reconstruction of a fourteenth-century astronomical instrument: a planetary equatorium described in a manuscript attributed to Geoffrey Chaucer. At last year's Graduate Symposium I introduced my research into that manuscript and the instrument; I did not know then that I would spend much of the following year investigating a 1950s replica of it. Conceived by historian of science Derek Price as a huge, tangible realisation of medieval astronomy for Cambridge's then-newly-opened Whipple Museum of the History of Science, the equatorium was displayed, discarded, stored, catalogued with that rather whimsical name, and finally rediscovered. Its construction in the Cavendish Laboratory, under the patronage of Sir Lawrence Bragg, and its first display at the Royal Society allow it to tell us much about the significant scientific institutions and figures of that period. The twists and turns of its subsequent biography reflect the development of the discipline of history of science and important changes in museum practices.

Determination of the degendogenous H_2S concentration in cells using the mitochondria-targeted MitoAzidoarene

"Understanding metabolism during heart attack (cardiac infarction)"

Sabine Arndt

PhD Biology (at the Mitochondrial Biology Unit) *(2nd Year)*

Hydrogen sulphide (H_2S) is produced endogenously in cells and can modulate metabolism. While the mechanisms of H_2S activity are varied, it has recently been suggested that an aspect of its signalling role lies in its capacity to attach covalently to protein thiols and thereby modulate their activity. The mechanisms and targets of this activity – termed sulphydration – remain elusive as well as the endogenous H_2S concentration in cells and the conditions under which sulphydration occurs. The endogenous concentration in literature is reported from low nM to high µM. The higher end might be due to the methods applied, which might detect both protein-bound acid labile and free forms of H_2S. We developed the mitochondria-targeted MitoAzidoarene, which reacts solely with free H_2S. We determined the sensitivity and specificity of the MitoAzidoarene to H_2S and now we are able to quantify the endogenous mitochondrial H_2S concentration in cells under different conditions.

The Deconstruction of Epic Antagonism in Homer's Odyssey

Emma Greensmith

MPhil Classics (Ancient Literature)

Within the many conflicting opinions and heated debates surrounding interpretation of Homer's *Odyssey*, there is one 'fact' in which everyone feels secure: who represent the villains of the epic. The Suitors of Penelope are gluttonous, rude, hypocritical and violent, and entirely deserve their divinely-sanctioned fate to be slaughtered by the triumphant hero Odysseus upon his return. The case, so far as scholarly consensus is concerned, is closed. I propose a re-reading of the Ithacan books of the *Odyssey* which will cast great doubt on the validity of this polarized interpretation and 're-open' the case for the Suitors. Focusing particularly on passages within Books 17 and 18, where Odysseus, disguised as a beggar, interacts with the Suitors who have usurped his palace, I aim to undertake a systematic cross-comparison between Odysseus and two members of the Suitor group. By applying elements of the recent innovative work done on Homeric characterisation and speech acts, I shall argue for the existence of subtle yet significant parallels in Homer's portrayal of Odysseus and these two adversaries of his, uncovering similarities where none have been noticed before. This comparative study will firstly encourage a nuanced approach to the Suitors by revealing how they engage with, mirror and influence Odysseus on a highly complex level. Yet it will also offer another means of understanding Odysseus' own character, revealing a different and more subversive side to him which is increasingly discordant with the triumphalist hero of the return plot.

Enabling Novel Conformal Devices through Nanotechnology

Paul Beecher

MPhil Public Policy – Discussing previous work undertaken with the Nokia Research Centre in Cambridge 2009-2013

Collaborating deeply with the University of Cambridge, Nokia Research Centre Cambridge UK develops nanotechnologies, advanced sensors and quantum technologies for mobile communication. Studying physical, chemical and biological phenomena and manipulation of matter at the nanoscale enables generation of knowledge for enhancing human capabilities. One of the primary objectives of the research carried out in Cambridge is to realise flexible, stretchable, thin, transparent conformal devices. Our guiding research question is, how can we fabricate and manufacture innovative mechanical structures that can be both transparent and compliant despite containing electronic and optical functions? This presentation will address some of the research problems that need to be overcome if reconfigurable electronic devices are to become a reality. This entails the investigation of novel electronic materials for fabrication of flexible and transparent electronics, encompassing such topics as stretchable interconnects, flexible battery technologies, and functional surfaces. There will also be a consideration of fabrication techniques compatible with subsequent industrial-scale production.

Network of Organic Chemistry to Biorefining

Philipp-Maximillian Jacob
PhD Chemical Engineering (1st Year)

In the light of growing sustainability concerns around the use of fossil resources the possibility of deriving many of the end-use molecules from biomass is receiving increasing attention across industry, academia and government. In analogy to crude oil refining this is termed biorefining. One of the key challenges encountered in the design of processing routes is the wealth of available starting materials, target molecules and processing routes, making treatment very expensive computationally and highly uncertain from the point of view of business and technology development. It was recently proposed to connect all known organic reactions into a network comprising several million entries. Using this network circumvents the computationally expensive need to predict each reaction step separately that many current methodologies rely upon. However, relying purely on existing knowledge is, in our minds, insufficient, as we are likely to discover many new reactions, not yet in the knowledge database. Hence, connecting data-mining for existing chemical knowledge with predictive capabilities of computational chemistry is highly desirable. This may be particularly interesting in relation to synthetic biology capabilities, yet largely untapped in biorefining. This project is trying to initially demonstrate the potential of this approach by applying it to the processing of terpenes.

Kripke on Empty Terms

Daisy Dixon
MPhil Philosophy (Philosophy of language)

Empty terms and the problem of non-being have caused philosophers of language, mind and metaphysics (to name a few) to tie themselves up into knots. The problem, stated briefly, is how a name that has no bearer can have any meaning. If the sole function of a name is to refer directly to an object or individual in the world, say, x, where there is no x, how can such a term have a meaning? More pressing still is the problem of negative existentials: we seem to say of an object x, that it does not exist. But what exactly are we referring to in order to say of it that it does not exist? I will focus exclusively on Kripke's theory of empty terms, in particular what he has to say about fictional names. The first part will be expository in nature, breaking down Kripke's account of empty terms in to three main points, and the second part will take each of these points in turn and consider problems with each. Ultimately, I will conclude that Kripke faces two dilemmas: one within his ontology of fictional characters, and another within his postulation of 'pretend propositions'.

New Therapeutic Targets to inhibit HIV-1 replication: The Role/s of DDX5 and DDX17 in HIV-1 Replication

Dr. Nyarie Sithole
PhD Medicine (1st Year)

HIV/AIDS is the largest global public health problem, infecting approximately 40 million people, having already killed 20 million. Antiviral treatment is good but requires lifelong adherence and the virus mutates and evade both drugs and the human immune response. In Professor Lever's lab the interaction of the virus with the cell is studied and in particular how the virus uses cell factors to help assemble itself and export new viruses. The role of cellular RNA helicases in trafficking viral RNA through the cell has recently been under study and by extensive screening a small number of these proteins critical to the virus have been identified. DDX5 and DDX17 appear to be important candidates which have not previously been identified as involved in HIV infection. Since cellular proteins will not undergo mutational escape the parts of the viral RNA interacting with them must also be more highly conserved and thus more vulnerable to therapeutic intervention. By using a series of cell biological, biochemical, molecular biological and imaging techniques to confirm our findings and establish the specific stage of the virus lifecycle which is affected by knockdown of these proteins and to evaluate where the interaction occurs within the cell.

A comparative perspective on accession, composition and production in England and Germany

"Alchemy and the law"

Jonas Baier
LL.M. Programme

"*No, no Tom. It`s mine, it`s mine." "No, no, John," said Tom. "It`s mine, it`s mine*" (*Dickens*, The Life and Adventures of Martin Chuzzlewit). Joy and Ruth aside, let`s assume John and Tom are struggling about a tangible "it". The Law has to provide an answer for them, and the question *who owns what in this land* is often harder to answer, than it seems at first glance. Already the issue, what the law considers as an "it" or Object (which can be subject to a Proprietary right) is often vaguer than expected. Let`s just assume Tom and John are arguing about a valuable leaf gilded medieval handwriting, which is loosely attached to others and stored in a library. What can be considered as Object in that regard? The library, the folder, each page, the golden foil, the ink or even each cellulose or iron sulphate molecule? The matter gets even more complicated, when the manufacturing society combines Objects by accession, composition and production. What happens to the Proprietary rights in the former Objects? Who owns the Proprietary rights in the new Objects, the mixture or the product? The answers to those questions are crucial, for the legal concord in a state in general and in case of an insolvency of one party in particular. Latter because Proprietary claims are much better protected than mere Unjust Enrichment or Contractual claims.

Organic Electronics: how does it work?

Chris Warwick
PhD Physics (3rd Year)

Organic electronics consists in using organic materials (such as plastics) in place of inorganics (such as silicon) in electronic devices. Technology utilising organics has already reached the marketplace in the form of organic LED displays and the e-ink featured in e-readers. Numerous other applications, close to being commercialised, will make use of organics' potential to be employed in flexible devices and in manufacturing large-area devices more cheaply (think iSnapBracelet, devices embedded in clothes, electronic floor tiles, solar cell plastic wrap etc.). Whilst the theories describing the transition from electrically insulating to conducting in inorganic materials are mature, the application of these same theories to organics has elicited nonsensical conclusions, thus requiring new theories to be developed. In our lab we subject organic devices to an array of electrical and optical characterisation techniques to piece together a more complete picture of electrical conduction in these systems. The lessons learnt from these efforts and similar efforts around the world have resulted in the improvement of the performance of these devices by more than six orders of magnitude in just a few decades*.

*using the field effect mobility of field effect transistors as a measure of performance.

Pantomimic gesture recognition for human robot interaction

Michael Burke
PhD Engineering (2nd Year)

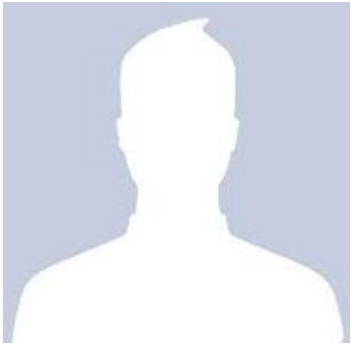
Traditional approaches to gesture-based robot control have involved the use of pre-defined codebooks or dictionaries of gestures, mapped directly to desired robot behaviours. These approaches typically require a significant amount of training on specific users, who also need to be aware of the set of commands used to select robot behaviour. Unfortunately, this prerequisite knowledge lowers the usability of gesture-based robot interfaces. We argue that pantomimic gestures are more intuitive than these iconic gestures and show that a truly pantomimic gesture recognition interface can be created by using recordings of robot behaviour to recognise human hand movements. A brief overview of single camera motion capture is provided, along with a description of an effective time series classification approach relying on a simple linear projection to separate behaviours. We illustrate this efficacy using a sample toy problem, where human hand gestures are used to select quadrotor take-off, land, summon, circle and hover behaviours.

Colonial British American Attitudes towards International Relations, c. 1727 – 1763

Daniel Robinson

PhD History (2nd year)

My research seeks to reinterpret political culture and the origins of revolutionary sentiment in the British American colonies during the high imperial period of the mid-eighteenth century, by looking at contemporary debates about European geo-politics and British foreign policy - subjects which have attracted no detailed attention from historians of early America. This paper will focus on a case study of perceptions of the Catholic, Austrian Empress Maria-Theresa during the Franco-Austrian struggle of the 1740s, in the five predominantly Calvinist colonies of New England and New York, exploring the interactions of theology and foreign policy in a wider, proto-American worldview.



Man is but a Worm: Using the nematode worm C. elegans to test the predictions of a new theory of why ageing happens

Josephine EEU Hellberg
MPhil Biochemistry

Ageing is one of the great mysteries of biology, and it is still not precisely known why organisms grow old and eventually die. An established suggestion is that ageing is the price organisms have to pay for enjoying fitness in youth, and this has become the topic of many theories of why ageing happens. Most famously, it has been suggested that ageing is the result of damage to cells and tissues caused by, for example, oxidative stress. In recent years it has however become clear that oxidative damage does not necessarily limit lifespan, creating the need for new theories of why ageing happens. One such theory suggests that ageing results when developmental programs fail to terminate once they are no longer needed, making them contribute to pathology rather than drive development. The predictions of this new theory of why ageing happens were tested using the reproductive system of the nematode worm *Caenorhabditis elegans*, as it displays characteristic pathologies with age: the gonad shrivels and atrophies, and the uterus fills up with tumour-like masses. Understanding how these pathologies develop will help shed light on the responsible mechanisms – in both men and worms –and therefore open up the possibility of intervening with the ageing process itself.

The Egyptian Army in Mexico, 1863-1867

Steven McGregor

PhD History (Middle East History) (1st Year)

446 slave soldiers from the Egyptian army formed part of Napoleon III's contingent in his attempt to conquer Mexico in the 1860s. Though the campaign was unsuccessful, the Egyptian troops served with distinction. Their presence, as part of an international group of auxiliary forces, attracted international attention and formed the basis for the first diplomatic confrontation between the United States and Egypt. The aim of my research is to understand why Egypt participated in this war and to determine how this event affected foreign relations between the two powers.

M-theory and Double Field Theory; why small and big circles are the same

Emanuel Malek

PhD Mathematics / Theoretical Physics (4th year)

In everyday life, we think we understand the concept of size and that "small" and "big" are easily distinguishable. I will show why in string theory small and big circles are the same thing, why this gives string theory interesting properties and why we should care in the real world. I will then describe my research in double field theory and show how this naturally describes string theory by treating small and big circles in the same way.

Why do animals look the way they do? Using Butterflies to investigate within-species and between-species variation

Joe Hanly

PhD in Developmental Biology (with Dept. of Zoology) (1st Year)

In the natural world, there are millions of living and extinct species, all related by descent, yet all with a unique physiology. In recent years, a molecular revolution has taken place, so now we can look at the DNA sequences that make animals. Despite this, biologists still really struggle to explain how the diversity we see in the world around us has come to exist. It was previously thought that evolution of form might happen when mutations occur in genes that make proteins, and a change to the protein would affect the form of the animal. However, we now know that proteins from animals as diverse as humans and fruit flies are often very similar to each other, despite the fact that we are separated by around 800 million years of evolutionary time. So variation in genes alone can't explain physiological differences between species, let alone differences between members of the same species. So where does the diversity in the natural world come from? In many cases, including in the neo-tropical butterfly *Heliconius melpomene*, it appears that the important differences that lead to variation are actually in non-coding, "junk" DNA, which regulates the times and places at which genes are turned on and off. My PhD project will aim to investigate this process further, using *Heliconius* as a model.

Ovid in Exile

Christina Tsaknaki
PhD Classics (2nd Year)

The Golden Age of Latin literature ends with the death of Publius Ovidius Naso in 17AD. Undoubtedly one of the greatest representatives of his time, Ovid (as he is more commonly known) influenced western art and literature more than any other Greek or Latin poet. He is most famous for his *Metamorphoses*, an impressive epic poem, fifteen books in length, which remains to this day our main source for Greek and Roman mythology. Some might know him as a great teacher of love, who takes upon him the difficult task of educating men and women on how best to find, and keep, a lover. A few might even have used his poetry as a useful manual on how to deal with heartbreak. But only a handful of people will have heard of his tragic end: to die, exiled from his beloved Rome, at the shores of the barbaric Pontus. In my presentation, I will introduce you to Ovid's 'swan songs', the poems he wrote during his exile, which have been largely neglected not only by readers but also by scholars. Following the path opened by another Petrean more than 40 years ago, I will explain why I believe Ovid's exilic work deserves the appreciation it has been deprived of so far and how I hope to prove that with my PhD thesis.

Using complex III haems to define the nature of the quinone pool and understand complex I quinone kinetics in mitochondria

"Using the activity of visible membrane proteins to understand the behaviour of invisible substrates"

Jamie Blaza

PhD Medical Research Council Mitochondrial Biology Unit (4th Year)

The mitochondrial electron transport chain represents the final stages of the journey many electrons take through our body. Here electrons move from NADH or succinate to finally consume oxygen and in doing so provide the energy to pump protons across the mitochondrial inner membrane. This proton gradient is then used to power ATP synthase, which regenerates the energy currency of the cell: ATP. An electron either starts in NADH or succinate and heads through complex I and II respectively. Both complex I and II feed electrons into the ubiquinone pool (Q-pool) and they then head through complex III, cytochrome c, complex IV and finally reduce oxygen to water. Recently it has been proposed that there is more than one Q-pool. However data will be presented that shows that this is not the case based on the response of complex III to NADH, succinate or both reductants together. Additionally strategies to understand the site of quinone reduction in complex I will be presented that allow it to be studied despite being largely spectroscopically silent.

Social Life in the Aftermath of the L'Aquila Earthquake

Jan-Jonathan Bock
PhD Social Anthropology (2nd Year)

On 6 April 2009, a powerful earthquake devastated the Italian city of L'Aquila. 309 people died; the city's 70,000 inhabitants were evacuated and spent months, some years, in tent camps and holiday resorts. The historic city centre became an inaccessible Red Zone, controlled by the Italian Army. Today, four years later, 20,000 people have left L'Aquila. The city centre remains uninhabited and largely inaccessible, a ghost town on the edge of Europe. 19 resettlement sites constructed in six months following the earthquake – a project championed by then Prime Minister Silvio Berlusconi – have destroyed L'Aquila's rural periphery and further isolated a distressed population. Unemployment, urban decay, resignation, and a feeling of abandonment characterise L'Aquila everyday life. My thesis explores the diverse dimensions of post-disaster life, and traces the strategies of recovery from trauma, displacement, and suffering Italians invent, explore, and negotiate in their attempts to remake 'normal' life under exceptional circumstances. This ethnographic investigation analyses what generic concepts such as 'disaster', 'belonging', or 'recovery' can concretely mean in the lives of ordinary people struggling to remake themselves as ethical subjects, as well as design purposeful life projects, following extreme experiences.

The leaf developmental gradient in plant species with C_3 and C_4 photosynthesis

"How do plants develop for a less bright tomorrow"

Britta Kuempers

PhD Biology – Plant Sciences (4th Year)

Green plants use photosynthesis to harness the energy of the sun. Some plants have evolved a more efficient version of photosynthesis called the C_4 pathway compared with the more common C_3 photosynthesis. The leaves of plants using C_4 photosynthesis show a very different anatomy compared with the C_3 leaves. I am investigating leaf development of four closely related C_3 and C_4 plants to analyse the differences in leaf development associated with C_4 photosynthesis. Following a detailed morphological study of developing leaves I have shown that young leaves of plants from both photosynthesis types contain gradients in leaf development from tip to base, with the tip possessing the same anatomy as mature leaves and the tissue at the base being undifferentiated. To understand the genetic regulation underlying the differences in C_3 and C_4 leaf anatomy, I am analysing which genes are expressed in which part of the developing leaf. Mapping the results of this data back to my anatomical study will allow me to identify genes that are differentially expressed in the different parts of the leaf. This will help detect genes that are essential in regulating the establishment of the anatomical features that are specific for C_4 species.

SUPPORTING PROSTATE CANCER & MALE MENTAL HEALTH INITIATIVES

MOVEMBER

Knowledge is Power • Moustache is King

Support the Peterhouse MCR & JCR Movember Team by helping to raise vital funds and awareness for prostate and testicular cancer and mental health. To find out more about Movember, view the team or donate simply follow the link below.

http://uk.movember.com/team/1109193