# Clareity Symposium 2016

10th March 2016

Gillespie Centre, Clare College
Cambridge

# Clareity Symposium 2016

## Programme

10.30 – Registration opens, Gillespie Centre

11.00 – Welcome by the Clareity President, Magda Sznurkowska, and opening address by the Acting Senior Tutor, Dr Jacqueline Tasioulas, Riley Auditorium (Gillespie Centre)

**Panel 1: 11.10-11:55**

Chair: Dr Jamie Hawkey, Dean

11.10 – 11.25 **Lisa Kent:** Drugging the "undruggable": using nanobody technology to target intracellular cancerous proteins

11.25 - 11.40 **Mark Agius**: Stigma in Psychiatric Hospitals in the Malta - a study of Mediterranean Culture

11.40 - 11.55 **Daniel Hurt**: Navigating AI through the 21st Century

**12.00 – 12.40 Keynote lecture by Prof Marina Frolova-Walker: Stalin's Playlist**

*12.40 - 13.25 Lunch break and poster session*

**Panel 2: 13.25-14.10**

Chair: Dr Sian Lazar, Graduate Tutor

13.25 - 13.40 **Arun Veerappan**: Why low carbon is a dirty word.

13.40 - 13.55 **Anne Kremmer**: Health and body size in Holocene hunter-gatherer and farming communities in East Africa

13.55 - 14.10 **Oliver McMillan**: The value of culture - indigenous perspectives on engineering and decision making

**Panel 3: 14.15 – 15.00**

Chair: Anne Henow, MCR President

14.15 - 14.30 **Josephine von Zitzewitz**: Leningrad Samizdat journals as Social networks

14.30 - 14.45 **Jake Sullivan**: Un-follow the Leader: Can Reducing the News Feed Mitigate Facebook's Stressful Side Effects?

14.45 - 15.00 **Sam Fabian**: Taking wing: how terrestrial ecosystems hinge on pivotal evolution in insect biomechanics

*15.00 - 15.20 Tea Break*

**Panel 4: 15.20 – 16.05**

Chair: Dr Meredith Shafto, "Clareity CRAs"

15.20 - 15.35 **Jing Jin**: Alaska, America, and the Arctic

15.35 - 15.50 **Callum McKenzie**: No way out: an investigation into preventing cell division in cancers.

15.50 - 16.05 **Matthew Langton**: Nano-rings, chains and molecular machines: exploiting weak intermolecular interactions for template-directed synthesis

**16.10 – 16:50 Keynote lecture by Prof Lorraine Tyler: The adaptive brain: cognition and ageing**

*16.50 - 17.10 Tea Break*

**Panel 5: 17.10 – 17.55**

Chair: Dr Maciej Dunajski, Graduate Tutor

17.10 - 17.25 **Rebecca Fell**: Why has gossip got such a bad rap?: a study of gossip in the 19th Century Novel

17.25 - 17.40 **Andrés Bustamante**: Archaeology for the Revolution: The politics of pre Columbian art in 20th century Mexico

17.40 - 17.55 **Jamie-Oliver Males**: Tales from the treetops

**Panel 6: 18.00 – 18.45**

Chair: Magda Sznurkowska, Clareity President

18.00 - 18.15 **Ditlev Rindom**: Celluloid Diva: Staging Leoncavallo's "Zazà" in the Cinematic Age

18.15 - 18.30 **Edoardo Gaude**: Cancer metabolic state can predict patient survival

18.30 - 18.45 **Jiho Han**: Design for a High Power Laser System with Built in Spatial Phase Modulation

18.45 – Closing of the Symposium by the Acting Senior Tutor, Dr Jacqueline Tasioulas

*18.45 - 19.15 Wine and nibbles in the Garden Room (everybody welcome)*

*19.30 – Dinner for speakers and chairs*

# Abstracts

## Panel 1: 11.10-11.55

### Drugging the 'undruggable': using nanobody technology to target intracellular cancerous proteins

Lisa Kent, PhD Student, Department of Pathology

Since the approval of the first monoclonal antibody, Orthoclone OKT3, in 1986, this drug class has rapidly grown to dominate the biopharmaceuticals market. Approximately 50 monoclonal antibodies are currently approved for a wide range of diseases in the US and Europe, and by 2020 this figure will increase to ~70 with combined worldwide sales reaching ~$125 billion. Monoclonal antibodies work by binding with high specificity and affinity to proteins, most commonly receptors on cell surfaces to physically block them and subsequently hinder their function. Whilst antibodies fulfil the criteria to effectively target proteins on cell surfaces, they are less efficient in penetrating cell membranes and targeting intracellular proteins, which is where many major cancer-causing proteins are located. A relatively new class of therapeutic antibodies called 'nanobodies' offer numerous advantages over conventional monoclonal antibodies. Whilst many nanobodies are still developed to target cell surface proteins, their properties may make them physically capable of reaching cancer protein targets inside cells. For example, they are around half the size of conventional antibodies, which would allow them to enter cells more easily and they can be engineered to incorporate signals, which would direct them to certain 'compartments' within the cell. My PhD project focuses on the creation, development and efficacy testing of nanobodies against a major class of intracellular cancer protein targets, which are implicated in up to 70% of all human cancers.

### Stigma in Psychiatric Hospitals in the Malta- a study of Mediterranean Culture

Mark Agius, CRA, Department of Psychiatry

This presentation was first developed for the Royal College of Psychiatrists Transcultural Psychiatry Group. It uses historical, anthropological and medical information to describe stigma and its impact on admission to psychiatric hospital in Malta over the years. It describes how the main Hospital has dealt with this by putting itself within the mainstream of Maltese Culture, including Maltese traditional Fiestas. It then argues that this illustrates that there is a Mediterranean culture which has a number of similarities in the West, Central and eastern Mediterranean. In a final twist, this presentation relates some of the issues raised to events in Medieval Cambridge!

### Navigating AI through the 21st Century

Daniel Hurt, Undergraduate Student, Medicine (Pre-Clinical)

I offer suggestions on how governments and businesses can manage the risks, whilst maximising the benefits, posed by Artificial Intelligence (AI) over the course of this century. This begins

with outlining the history and present state of the art, summarising predictions made by experts in the field on how it might progress in the coming decades. I give an overview of the dangers that advanced AI applications may present across a range of industries:
- Financial Services
- Medicine and Healthcare
- Autonomous Vehicles
- Warfare and Strategy
- Greater-than-Human-Intelligence

Throughout I avoid discussion of the technical details of AI development, but focus on how states and private institutions can increase the likelihood that the social, economic and political impact of advanced AI will be positive. Recommendations are made in the following themes:

— Develop flexible anticipatory frameworks across these industries that will facilitate adaptation to rapid or unanticipated progress in AI. These must be drawn up in collaboration with experts who are most knowledgeable about the future of the field, and designed to ensure developments are socially beneficent.

— Improve dialogue between researchers, industry, and government to foster a culture of openness and safety. This will help to avoid undesirable outcomes in areas where it poses dangers to human life, and help policymakers lay the groundwork for fully realising its positive effects for their constituents.

— Encourage international collaboration on AI, particularly in situations where it might be used for military purposes.

## Panel 2: 13.25-14.10

**Why low carbon is a dirty word**

Arun Veerappan, Undergraduate Student, Land Economy

Researchers, policymakers and NGOs are all committed to realising a 'Low Carbon Economy' in the UK and Europe.

Yet whilst it is generally accepted that fossil fuels represent a risk for society and investors alike, no one seems to be quite sure on the solution. Having led a seminar at LSE, advised Zero Carbon Group and acting as incoming analyst at Bernstein, I hope to explore the problems of focussing solely on low carbon investment. Understanding what the term actually means and what it can deliver is vital if we want to achieve real sustainability. Navigating this complex and often confusing landscape is one of the greatest challenges affecting Clare, the University and the wider economy.

**Health and body size in Holocene hunter-gatherer and farming communities in East Africa**

Anne Kremmer, MPhil Student, Human Evolutionary Studies

My presentation will address the hunting/gathering to farming/herding transition in Africa, more specifically in the Sub-Saharan region. During this transition in the different parts of Europe, numerous changes can be observed in the anthropological, as well as in the archaeological record, for example the first appearance of pottery, cattle etc. New diseases develop and existing ones spread to a greater extent in the population. Additionally, in many parts of Europe, the Mesolithic-Neolithic transition seems to be accompanied by a change in DNA of the local population. Most interpretations of these changes state that they should be attributed to a new population replacing the Mesolithic hunter gatherers and introducing agriculture and farming, and to the effects this new lifestyle had on the populations.

Similar studies have been carried out on South African material. These studies assume that mainly the idea of farming spread across an existing population and that there was assimilation of the latter. But how this transition developed in other parts of Africa, and how it affected human health and stature is yet not very well explored. The aim of this project would be to analyse Mesolithic, Neolithic and more recent skeletons from Sub-Saharan Africa and determine whether there has been any change in stature or disease within these populations and maybe also how disease could have affected the body size of these populations. However, samples of human remains from that period remain rather rare.

**The value of culture - indigenous perspectives on engineering and decision making**

Oliver McMillan, PhD Student, Department of Engineering

Indigenous communities are often neglected by engineering projects because their values are not easily accounted for in the models that are used by consultants, leading to the loss of culturally or historically significant artefacts or sites. This talk presents a novel technique of accounting for a wider range of stakeholders and applies it to a case study involving the management of Lake Rotoiti in Rotorua, New Zealand, which has significant environmental, economic and social impacts for the region. The model highlights cultural effects of the different options that had not been previously accounted for and allows for a greater involvement of Maori communities in the consultation process.

## Panel 3: 14.15-15.00

### Leningrad Samizdat journals as Social Networks

Josephine von Zitzewitz, CRA, Department of Slavonic Studies

Samizdat was the practice of multiplying and distributing texts that were not available in officially printed editions during the final decades of the Soviet Union. Samizdat was a writing culture, a reading culture and practice that created community, especially once samizdat periodicals became established. Authors and readers alike were complicit in an activity that was effectively outlawed. Moreover, periodicals required far more than authors and editors: networks of people were involved in procuring typewriters and paper, compiling and typing up manuscripts, and binding and distributing the finished journals on a regular basis.
My interest is in literary samizdat, and specifically in the journals that became unofficial Leningrad's preferred vehicle for the distribution of new writing in the 1970s-80s. The typewritten journals came out in tiny print runs but were read by a comparatively large number of people; they were a way of cultivating reading habits and a world view as much as they were a publishing venture. This paper investigates the role of literary samizdat journals as a form of social media long before the digital age.

### Un-Follow the Leader: Can Reducing the News Feed Mitigate Facebook's Stressful Side Effects?

Jake Sullivan, MPhil Student, Department of Psychology

Facebook is a dominant global force, with over one billion people logging into the site every day. Despite its popularity, however, research demonstrates that using Facebook makes people less happy over time. One way this occurs is through the phenomenon of information overload, where someone is flooded with too much information. Another mechanism is envy caused by social comparison. A third stressor is the demotivating feeling of having spent too much time on the site rather than doing something more meaningful. All of these issues relate to people seeing too many posts from acquaintances, so a reasonable strategy to curb them is to restrict one's Facebook updates to a smaller group of important, valued friends. This can be done by 'unfollowing' people, removing their posts from the News Feed. The question investigated here is whether Facebook's stressful side effects can be reduced by unfollowing content on the News Feed. If so, this approach suggests a strategy for treating "Facebook depression".

### Taking wing: how terrestrial ecosystems hinge on pivotal evolution in insect biomechanics

Sam Fabian, PhD Student, Department of Physiology, Development and Neuroscience

Within terrestrial systems, insects are the dominant animal group under almost any criteria. Their success is down to a huge number of factors throughout every part of their physiology and life histories. However, arguably none more so than that they are the only known invertebrates to learn to fly, and did so over 150 million years before any vertebrate could perform so much as an

elongated hop. Flight demands a huge change in physiology and requires extensive specialisations, making early flying insects cumbersome on the ground. Further refinements have allowed insects to fold wings away, beat them faster and get smaller, ultimately culminating in division of labour and setting aside castes of individuals specialised to either ground or flight based locomotion within the same species. This ability to distribute, mix and propagate has allowed insects to integrate at all levels of all terrestrial ecosystems, becoming both the dominant herbivores and carnivores in the world's most diverse biomes.

## Panel 4: 15.20-16.05

**Alaska, America, and the Arctic**
Jing Jin, MPhil Student, Polar Studies

In 1971 a group of Canadian and American nuclear rights activists from the British Columbia chapter of the Sierra Club sailed on a ship, named Greenpeace, to protest nuclear testing in Alaska. This is a story not only of Greenpeace's birth as an international environmental protest organization but also of outside activists intervening in Alaska, in the name of environmental protection and human health, against industry and government. It is a story that has been played out again and again in Alaska's history and through which the development of the American environmental movement can be told. My particular interest is in Alaska's influence on American environmental law and, in turn, how American legal principles were translated into environmental laws and policies in other Arctic nations. My talk will address the three environmental policy precedents that the U.S. National Environmental Policy Act of 1969 established: science-based assessments, intergovernmental regulation, and civic participation.

**No way out: an investigation into preventing cell division in cancers.**
Callum McKenzie, PhD Student, Department of Pathology

With latest figures revealing approximately 1 in 2 people will be affected by cancer at some point in their lives, it is of no surprise the importance of finding suitable therapies to slow the growth and regress tumour development. One means of treating cancer is to target cell division to inhibit the growth of cancer cells. The division of the cell, or the cell cycle, consists of replicating DNA (synthesis phase) and separating this into two genetically identical daughter cells (mitosis). My research focuses on the final stage of mitosis, cytokinesis, responsible for physically cutting the cell into two. Many proteins are necessary to facilitate completion of cytokinesis, and a poorly investigated protein, and what my PhD focuses on, is called Citron kinase (CIT-K). CIT-K is essential for cytokinesis, as its depletion from the cell causes cytokinesis failure, resulting in multinucleation (the possession of 2 or more nuclei per cell). I have shown in colorectal, breast and cervical cancer cell lines that depleting CIT-K, fails cytokinesis, which inhibits the proliferation of cells and as a consequence cells die in a specialized process called apoptosis. My work positions CIT-K as an attractive cancer therapeutic and provides compelling evidence to develop a kinase inhibitor (not currently developed) against this protein.

**Nano-rings, chains and molecular machines: exploiting weak intermolecular interactions for template-directed synthesis**

Matthew Langton, CRA, Department of Chemistry

The synthesis of functional supramolecular systems with precise control from simple molecular building blocks is crucial if long-proposed nano-technological applications are to be realised.

In this presentation I will introduce the concept of template-directed synthesis, in which the control of multiple weak intermolecular interactions between small molecule building blocks and templates enables complex functional architectures to be prepared with a precise, programmable structure. Remarkable compounds such as nanorings, nano-chains and mechanically interlocked molecules (the precursors to synthetic molecular machines) can be accessed in this way, which would typically be unobtainable through classical chemical synthesis methodologies. I will discuss recent work in which we have used such systems for exploring fundamental intermolecular interactions and highlight applications in molecular recognition and sensing.

## Panel 5: 17.10-17.55

**Why has gossip got such a bad rap?: a study of gossip in the 19th Century Novel**

Rebecca Fell, PhD Student, Department of Spanish and Portuguese

Gossip and 'public opinion'—in Spanish 'el qué dirán ("what will people say?")—controls and adulterates the nineteenth century protoganist or heroine, literally and figuratively. To name a few: Gustave Flaubert's *Madame Bovary*, Henry James's Isabel Archer in *The Portrait of a Lady*, Ana Ozores in Leopoldo Alas' *La Regenta* or the Regent's Wife, Anna Karenina in Tolstoy's novel of the same name. No wonder Alice walks through the Looking Glass. It's not truth but public opinion that drives the status or social capital of these women in their communities. Gossip often provides plot or, using Todorov's words, 'the secret of the narrative.' Either a piece of information or gossip must remain "secret" due to the stigma attached and/or it seeps through the pages, like a virus, literally adulterating established social codes and contracts. Rumours abound. Word spreads. In my paper I will explore the role of gossip in the texts referenced, amongst others. I will argue that the forces of rumour and gossip are binary, but not necessarily mutually exclusive: negative, controlling and condemning but possibly positive and convention-flouting. Further, it's often the gossipy authorial voice that gives the nineteenth century male author's game away. These women are the code-breakers and transgressors of society; nonetheless, the author is transfixed. The sheer delight or 'plaisir du texte' to quote Roland Barthes with which they confide in the reader about their heroine betrays their affection for her. Gossip is the mouthpiece for subversion of the status quo.

**Archaeology for the Revolution: The politics of pre-Columbian art in 20th century Mexico**

Andrés Bustamante, MPhil Student, Archaeology

After nearly a decade of upheaval, the Mexican Revolution came to an end in 1917. While the violent phase of the conflict had ended, the ideological battles now began in earnest. In order to challenge the remnants of the pre-Revolutionary authoritarian regime and write a new history for the nation, the state turned to an unlikely source to disseminate its message: pre-Columbian art. The artistic traditions of Mexico's pre-conquest civilizations (namely the Olmecs, Aztecs, and Mayas) re-emerged through large-scale archaeological projects and state-sponsored murals depicting indigenous themes painted by prominent artists like Diego Rivera and Miguel Covarrubias. This presentation will examine the political function of art and archaeology in the formation of a radically new Mexican identity and the assertion of national sovereignty as part of an ongoing cultural project that spanned the 20th century.

As a case study, I will discuss the 1982 repatriation of the Tonalámatl Aubin codex, an Aztec prophetic calendar, from the Bibliothèque Nationale de France. The repatriation intersected with a catastrophic economic crisis, which highlighted fears of foreign intervention and, in the minds of the public, linked contemporary predatory bank lending practices to legacies of colonial exploitation that had led to the looting of pre-Columbian art. In order to understand the Mexican state's response to the Tonalámatl's repatriation, it is essential to look back to the cultural heritage policies established in the aftermath of the Revolution and trace their long-term impact.

**Tales from the treetops**

Jamie-Oliver Males, PhD Student, Department of Plant Sciences

During my PhD I have been investigating the mechanisms by which plants succeed (and fail) in protecting themselves from variability in the availability of water. Specifically, I have explored the way that anatomico-physiological adaptations have shaped the evolutionary history of an intriguing family of plants from the tropical Americas: the bromeliads. Here I will discuss how my work has shed light on these plants in particular, alongside some of the key results arising from the international renaissance in the field of plant hydraulics. I end with a cautionary note on what does (and what doesn't) make biological diversity so fascinating.

## Panel 6: 18.00-18.45

**Celluloid Diva: Staging Leoncavallo's "Zazà" in the Cinematic Age**

Ditlev Rindom, PhD Student, Department of Music

Recent years have witnessed an explosion of live cinema broadcasts of opera, a development that has precipitated widespread discussion of the mediatisation of live performance and the threat posed to opera by cinema screenings. Such anxieties echo the arguments of recent musicological scholarship - notably Abbate and Parker's "A History of Opera" - which have identified the emergence of cinema as a prime cause in opera's popular decline. Yet the ways in which

conceptions of opera and audience spectatorship were transformed by the rise of motion pictures has been peculiarly overlooked, despite the topic's multiple contemporary resonances. This paper investigates such questions by focusing upon the production of Ruggero Leoncavallo's now-forgotten opera "Zazà" (1900) that was mounted at New York's Metropolitan Opera House in the 1920s as a vehicle for soprano Geraldine Farrar. A renowned Hollywood screen actress as well as the Met's most celebrated diva, Farrar was widely considered to be integral to the opera's successful revivification and indeed many critics observed that Farrar had transformed the role of the gypsy music-hall singer into a vehicle for her own iconography - in the process turning a tawdry, musically-thin melodrama into a national hit. I explore Farrar's complex, intermedial status in New York's changing entertainment landscape, and the different forms of realism at work in both "Zazà" and early Hollywood cinema, to argue that the production's success reflects changing conceptions of liveness and embodiment at the dawn of the cinematic age.

**Cancer metabolic state can predict patient survival**

Edoardo Gaude, PhD Student, Department of Oncology

Cancer formation has been defined as a genetic disease where mutations in multiple genes affect cell behavior and induce malignant transformation. Several studies have highlighted the role of genetic mutations in controlling cell metabolism. More in detail, most oncogenic mutations drive the activation of a specific metabolic pathway, namely glycolysis. Despite this initial evidence it is still unclear whether different types of cancer undergo common or convergent metabolic alterations. Moreover, the clinical relevance of metabolic transformation for cancer patients' survival has not been systematically investigated.
In this study we systematically assessed the expression of metabolic genes across 20 different cancer types from The Cancer Genome Atlas (TCGA) database. We have identified common metabolic signatures of cancer and linked them to patient's survival. Notably, inhibition of metabolic functions that take place within mitochondria was associated with the worst clinical outcome across all cancer types. Furthermore, we linked the loss of a specific mitochondrial function (oxidative phosphorylation) with the induction of cancer invasion and metastasis, the most common cause of cancer deaths. This comprehensive analysis revealed that, despite their vast genetic heterogeneity, different cancer types undergo convergent metabolic transformation that accompany tumour formation and progression. These findings might have important implications for patients' stratification, prognosis, and therapy.

**Design for a High Power Laser System with Built In Spatial Phase Modulation**

Jiho Han, PhD Student, Department of Engineering

Since it's invention, lasers are being used in countless applications including communications, precision measurements, medical devices, microscopes, display devices, weapons, welding, cutting, marking, micro-machining, display devices, or weapons, taking advantage the well defined wavelengths and optical power densities which were previously inaccessible to us. After over 50 years of development, we now have devices called 'Spatial Light Modulators', which can be used to impose an arbitrary beam shape onto our lasers. However, these devices often end up

as the power limiting factors within an optical chain, allowing this capability only for the low power applications.
We propose that for high power applications, it may be possible to bypass these limits by further amplifying the beam subsequent to shaping them through conventional method; unlocking the spatial modulating capabilities to high optical powers may allow us an 'optical stamp' like laser processes. Several different approaches have been investigated with the final method showing some promise; the shaped beam would be split in grid, then directed into separate fibre amplifiers, which would subsequently get assembled back into a grid. The system concept and detailed design considerations will be discussed in this talk.

# Poster Abstracts

**Should measurement of cognition be part of recovery programs for patients with Psychotic Illness?**

Mark Agius, CRA, Department of Psychiatry

The recovery model of schizophrenia is central to the development of community services for patients with schizophrenia. However often when applying the recovery model of psychosis, formal identification of cognitive impairments is not carried out, nor are interventions to improve cognitive functioning offered in a targeted way. Here we discuss how these issues relate to each other and argue for the use of cognitive testing in order to help recovery in schizophrenia.

**Are there different genotypes in Bipolar II and Bipolar I disorder and if so, why then do we tend to observe Unipolar Depression converting to Bipolar II and then converting to Bipolar I?**

Mark Agius, CRA, Department of Psychiatry

We review the recent literature in order to establish the importance of a spectrum for bipolar affective disorder, and that unipolar depression, bipolar II and bipolar I are discrete entities that may however evolve in sequence. We discuss clinical, genetic and neurobiological data which illustrate the differences between bipolar I and bipolar II. To fit the data we suggest a series of multiple mood disorder genotypes, some of which evolve into other conditions on the bipolar spectrum. Thence we discuss the nature of the bipolar spectrum and demonstrate how this concept can be used as the basis of a staging model for bipolar disorder

**Citalopram and the QT interval: The impact of new guidance on clinician's judgment**

James Austin, Undergraduate Student, Medicine

In 2011, the FDA published guidelines regarding the prescribing of citalopram and escitalopram following publication of evidence showing prolongation of the QT period at therapeutic doses. This paper looked at the impact of these guidelines on the prescribing practices of clinicians in one centre. It showed that clinicians have changed practices in accordance with the guidelines for citalopram but no clear patterns were seen in escitalopram or when looking individually at thespecific guidelines for patients over 60 years of age. There was no evidence of increased concordance by clinicians with the guidelines in patients taking other QT prolonging drugs who are at additional risk. Overall, the guidelines have made an impact on practice but this is partial and 2% of all patients still remain on regimes that do not fit the guidelines. The possible reasons for this are explored.